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GREEK FOUNDATIONS OF
TRADITIONAL LOGIC

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GREEK
FOUNDATIONS OF
TRADITIONAL
LOGIC

By ERNST KAPP

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PREFACE

THE five chapters of this little book represent the manuscript of a series of five special lectures which I gave at Columbia University by invitation of the Department of Philosophy and the Department of Greek and Latin. It was not only this single occasion that made me attempt to deal with the subject so that nothing either of exclusively philological or of exclusively philosophical interest would be mentioned. Ancient logic is a subject of common interest to both departments, and in the pursuit of this interest the logician has to take the risk of dilettantism in classics, and the philologically trained interpreter of Plato and Aristotle the perhaps more frightening risk of dilettantism in logic. It would be stupid on the part of either not to expect and to accept gratefully the help, if offered, of the other; but if there is to be communication without waste of time, each must agree to leave aside much of his own never-finished business. This does not mean that, for the sake of interdepartmental communication and collaboration, one should confine himself to noncontroversial statements; under this condition not much would be left of interest in the field of ancient logic. But the problems discussed and the form of discussion should not be such as would be understood only by specialists in either field.

Selection of problems and restraint in the display of details being essential to an attempt of this kind, I have made only slight alterations in the text of my lectures and have added only some occasional notes. My omissions in dealing with the subject had to be partly arbitrary and even accidental; but not all of them are such, and in this Preface perhaps a word should be said about what is deliberately left untouched.

It seems as if logic might safely "be said to be more abstract, more general, more formal, than any other science, except perhaps pure mathematics";¹ although there is a wide difference of opinion as to

¹ Keynes, *Formal Logic*, 4th ed., p. 2.

whether it is a final achievement² or rather an aberration from the true nature of the subject that "logical forms are treated as *merely* formal."³ What is now called "formal logic" goes back mainly and ultimately to the abstract treatment of syllogistic forms in Aristotle's *Prior Analytics*, not to the *Posterior Analytics*, which, as Aristotle's treatment of scientific demonstration, is, of course, brought into contact with the actual sciences of the time, especially the mathematical. Now, it seems natural—and, besides, it makes opponents of the traditional continuation of Aristotelian logic feel quite generous—to presume that Aristotelian logic was related to the scientific and cultural standards of its time in the same way in which modern logic is asserted to be related to the standards of our time. Whoever is inclined to understand this relationship as an essential or at least genetic dependence of what is "more abstract, more general, more formal" on what is less abstract, less general, less formal, will be tempted to interpret the *Prior Analytics* in relation to the *Posterior Analytics* and to Aristotle's nonlogical works, or to Platonic philosophy, or even to the whole of Greek science and culture. Many different attempts have, indeed, been made to explain the abstract aspect of Aristotle's syllogistical forms as the "more formal" outgrowth (legitimate or illegitimate) of something less formal and more material; and from this point of view the least one might expect from any general treatment of ancient logic would seem to be a complete discussion of the relation of Aristotle's logic to contemporary science, as documented in the *Posterior Analytics*. I am far from underrating the importance and urgency of such a discussion⁴; but I am convinced that considerations of the kind

² Julius Stenzel in Pauly-Wissowa, *Real-Encyclopädie*, s.v. "Logik," Vol. XIII, col. 992: "die abschliessenden Leistungen griechischer Abstraktion"; cf. my remarks, *ibid.*, s.v. "Syllogistik," Vol. IV A, cols. 1051 and 1066.

³ Dewey, *Logic*, p. 94.

⁴ For the problems involved see: Friedrich Solmsen, *Die Entwicklung der aristotelischen Logik und Rhetorik*, Berlin, 1929 ("Neue Philologische Untersuchungen" IV); Friedrich Solmsen, "Platos Einfluss auf die Bildung der mathematischen Methode," *Studien zur Geschichte der Mathematik*, I (Part 1), 93 ff.; Kurt v. Fritz, "Platon, Theaetet und die antike Mathematik," *Philologus*, LXXXVII, 40 ff., 136 ff.; some passages in my article "Syllogistik," in Pauly-Wissowa, *Real-Encyclopädie*, Vol. IV A; W. D. Ross, "The Discovery of the Syllogism," *Philo-*

I am going to propose ought to come first. They will, I hope, speak for themselves; but if I decline to accept as a starting point the now almost universal opinion that the necessary approach to Aristotle's logic is from the material side, not from the formal side, it may be desirable to state that Aristotle's writings contain not a single passage which favors such an approach and that from his own theoretical and systematical point of view Aristotle himself decided flatly to the contrary: "Syllogism should be discussed before demonstration, because syllogism is the more general: the demonstration is a sort of syllogism, but not every syllogism is a demonstration" (*Analytica priora* 25b, 28-31).⁵

Throughout these chapters I shall have to confront certain features of ancient logic with certain features of "traditional" logic or the traditional ingredient in other types of modern logic; I hope this will excuse the comparatively large, but desultory, use I have made, in a small book, of quotations from more or less modern authors.⁶ My special indebtedness to Cohen and Nagel's *Introduction to Logic and Scientific Method*, which I consulted as an outstanding presentation of the views of modern logic in general, must be mentioned separately; I am sure it needs no apology. Quotations from ancient authors, mainly Plato and Aristotle, are, of course, given in translation. It seemed advisable to adhere as far as possible to Jowett's translation of Plato's dialogues and the new Oxford translation of Aristotle's works.⁷ Any departures from these versions

sophical Review, XLVIII (1939), 251 ff; Friedrich Solmsen, "The Discovery of the Syllogism," *Philosophical Review*, L (1941), 410 ff.

⁵ Prantl's *Geschichte der Logik im Abendlande* was a great attempt to take the theoretical responsibility for "formal" logic away from Aristotle and to put the blame for it on the later historical development. But with due respect for an immense effort and for any scholar who may still, consciously or unconsciously, be influenced by it, it must be said that the argument was against clear evidence.

⁶ A list of the books referred to is given on p. 89. I must acknowledge my obligation to Harcourt, Brace and Company, Inc., publishers of *An Introduction to Logic and Scientific Method*, by M. R. Cohen and E. Nagel, to the Thomas Y. Crowell Company, publishers of *Humanistic Logic for the Mind in Action*, by P. Reiser, and to Prentice Hall, Inc., publishers of *Logic in Theory and Practice*, by C. G. Shaw, for kindly permitting certain quotations.

⁷ *The Works of Aristotle*, translated into English under the editorship of W. D. Ross, Oxford, 1908-1931.

have been mentioned in the notes, and I have commented upon the translators' work only in cases in which my special subject is immediately concerned.

The publication of this book in the "Columbia Studies in Philosophy" was made possible in a spirit of hospitality for which I am sincerely grateful to all concerned. My special thanks are due to Professor Clinton W. Keyes, Professor Ernest Nagel, and Professor John H. Randall, who after reading my manuscript contributed helpful criticism. Professor Keyes has even been kind enough to do a Samaritan's work with some of my English. I am also deeply indebted to the Columbia University Press and to its Assistant Editor, Miss Ida M. Lynn, whose suggestions during the preparation of the manuscript for printing were extremely valuable. For the helpful index I have reason to think that readers will be as grateful as I am to its compiler, Miss Eugenia Wallace.

ERNST KAPP

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**GREEK FOUNDATIONS OF
TRADITIONAL LOGIC**

CHAPTER I

THE ORIGIN OF LOGIC AS A SCIENCE

IT is an old story that the historical foundations of traditional logic were laid in ancient Greece, and the fact is universally acknowledged. But today either the competition of modern logic or dissatisfaction with formal logic of any kind has caused traditional logic itself to lose so much of its appeal, even with the scholarly minded, that a reconsideration of the Greek foundations of traditional logic may seem rather superfluous. Good-natured people will, perhaps, admit some historical interest which may entitle the classical student to discuss the subject if he can find anyone to listen to him. But less good-natured people will be suspicious of his claims. My friend E. Panofsky once remarked: "We art historians act under the assumption that no one ever invented anything, while you classical scholars act under the assumption that the Greeks invented everything." The less good-natured reader will probably suspect that it is the aim of my remarks to extol the well-known Greek origin of the science of logic beyond its real importance and to make Greek logic the standard of logic in general.

I may say at the beginning that I am not going to do anything of the kind. On the contrary, in my opinion modern logicians make themselves or at least their audiences too dependent on the original Greek conception and constitution of a science of logic, whenever they refer to or oppose the doctrines and peculiarities of Aristotelian logic in a way that gives the impression that the subject matter and purpose of this ancient logic were identical with those of modern logic.) It is the danger of an unconscious and misleading dependence on traditional doctrines which are no longer adequately understood, not exaggerated claims for the classical writers on the science of logic, that still calls for attention to its Greek origin. Along these lines, I believe, I may promise a little more than the mere satisfaction of historical curiosity.

I have been referring to logic as a science, and most modern logicians will scarcely object to that classification, even if science is understood in its strictest sense. But this description would not fit all the kinds of logic that have been taught for many centuries by philosophers and educators. If, however, we permit ourselves to use the word "science" a little less strictly and reverently, that is, to indicate something that is treated systematically in a lecture course by professors for the instruction of their students and is capable of being codified in the professor's manuscript or in a textbook, then we may assert that the science of logic has existed now for about 2,280 or 2,290 years.

Fortunately we can still read the words which Aristotle once wrote down—probably about 345 B.C.—when he prepared an epilogue for his first comprehensive logical course, a course on what he called the dialectical syllogism. But before we come to Aristotle's words, it is desirable to give a few explanations of terms and titles. A dialectical syllogism is an argument, concerned with a problem suitable for discussion, in which a conclusion is drawn from premises that are likely to be admitted by a debater. The Greek verb *διαλέγεσθαι* from which "dialectical" is derived means simply to interchange one's thoughts in conversation. There are two main species of syllogisms, according to Aristotle, the dialectical syllogism and the so-called "apodictical" syllogism. The apodictical syllogism is the syllogism which demonstrates, it is the drawing of a conclusion in a scientific way, that is, in a way that produces knowledge and does not merely enforce assent upon the interlocutor as the dialectical syllogism does, or tries to do. According to Aristotle the premises of an apodictical syllogism have to be more than likely, they have to be true; and even more than that, they must be either immediately self-evident or be deducible from self-evident principles. We have three treatises of Aristotle on syllogisms, which form the bulk of his extant logical writings, more than six-sevenths of the *Organon*, or "instrument" of philosophy, as in later times this collection was called. Of the three treatises, one contains the above-mentioned course on the dialectical syllogism, which for conven-

ience Aristotle called "Topics." The name does not mean much, only that the treatise is concerned with "places for finding" something, namely, though Aristotle does not say so, for finding arguments. Then we have an Aristotelian treatise on the apodictical syllogism, the so-called "Posterior Analytics." And thirdly there is a work on the syllogism in general, which introduces the famous doctrine of the syllogistical "figures" (*σχηματα*). According to Aristotle's arrangement the treatment of the syllogism in general was supposed to precede the treatment of the apodictical syllogism and is therefore called "Prior Analytics." The title "Analytics," again, does not specify the subject, it simply indicates that the book is concerned with analyzing.)

Now let us consider the epilogue of the *Topics*. We must imagine that we have been attending Aristotle's lectures for some not-too-short time, but that the course has come to an end. After a brief recapitulation of what he promised at the beginning of the course and of what he has actually dealt with in his lectures, the master continues (183b, 15): "That our programme, then, has been adequately completed is clear. But we must not omit to notice what has happened in regard to this inquiry. For in the case of all discoveries the results of previous labours that have been handed down from others have been advanced bit by bit by those who have taken them on, whereas the original discoveries generally make an advance that is small at first though much more useful than the development which later springs out of them. For it may be that in everything, as the saying is, 'the first start is the main part'; and for this reason also it is the most difficult; for in proportion as it is most potent in its influence, so it is smallest in its compass and therefore most difficult to see: whereas when this is once discovered, it is easier to add and develop the remainder in connexion with it. This is in fact what has happened in regard to rhetorical speeches and to practically all the other arts: for those who discovered the beginnings of them advanced them in all only a little way, whereas the celebrities of to-day are the heirs (so to speak) of a long succession of men who have advanced them bit by bit, and

so have developed them to their present form, Tisias coming next after the first founders, then Thrasyarchus after Tisias, and Theodorus next to him, while several people have made their several contributions to it: and therefore it is not to be wondered at that the art has attained considerable dimensions. Of this inquiry, on the other hand, it was not the case that part of the work had been thoroughly done before, while part had not. Nothing existed at all." And then, after contending that making one's pupil learn by heart ready-made pieces of dialectic questions and answers was, of course, not teaching an art or a science any more than presenting to a man sets of shoes of all sorts would be teaching him the art of shoe-making, he concludes: "Moreover, on the subject of Rhetoric there exists much that has been said long ago, whereas on the subject of reasoning¹ we had nothing else of an earlier date to speak of at all, but were kept at work for a long time in experimental researches. If, then, it seems to you after inspection that, such being the situation as it existed at the start, our investigation is in a satisfactory condition compared with the other inquiries that have been developed by tradition, there must remain for all of you . . .² the task of extending us your pardon for the shortcomings of the inquiry, and for the discoveries thereof your warm thanks."

These words of naïve and yet at the same time a little too artificially elaborate self-praise may in themselves characterize their author as a comparatively young man—a beginner not only in the sense which he himself describes; but certainly they make it perfectly clear that at the time when they were written or spoken no competitive didactic system on logical matters was yet in existence. It does not even seem likely that Aristotle's own systematic investigation of the apodictical syllogism and the syllogism in general had already led to noteworthy results, for in that case these studies would have deserved a reference. And, indeed, if one compares the logical doctrine displayed in both *Analytics* with the contents of

¹ The Greek original has: "of (making) syllogisms."

² The words "or for our students" (rather: "that is, the audience"), an explanation of "you," scarcely go back to Aristotle's own hand.

the *Topics*, this view is confirmed. The first and most important step toward a historical understanding of Aristotle's logic was taken more than a hundred years ago by the German scholar Christian August Brandis in a quite unpretentious article on the traditional sequence and the original chronological order of Aristotle's logical writings.³ He pointed out that Aristotle's *Topics* would be entirely different if Aristotle had worked it out after he had finished his *Analytics*. This simple statement of the chronological priority of the *Topics* to the *Analytics*, in spite of the traditional arrangement and in spite of some later additions to the text of the *Topics* by Aristotle's own hand, has been corroborated by more recent investigation; but up to now its far-reaching consequences for an understanding of the kind of logic which Aristotle brought into being do not seem to have been fully realized.

In order to make clear what I mean by "far-reaching consequences" I shall here introduce two quotations from modern books. The first, taken from an excellent modern textbook, describes the present position of the science of logic. It is found on the first page of Cohen and Nagel's *Introduction to Logic and Scientific Method*:

"Though formal logic has in recent times been the object of radical and spirited attacks from many and diverse quarters, it continues, and will probably long continue, to be one of the most frequently given courses in colleges and universities here and abroad. Nor need this be surprising when we reflect that the most serious of the charges against formal logic, those against the syllogism, are as old as Aristotle, who seems to have been fully aware of them. But while the realm of logic seems perfectly safe against the attacks from without, there is a good deal of unhappy confusion within. Though the content of almost all logic books follows (even in many of the illustrations) the standard set by Aristotle's *Organon*—terms, propositions, syllogisms and allied forms of inference, scientific method, probability and fallacies—there is a bewildering Babel of tongues as to what logic is about. The different schools, the

³ "Ueber die Reihenfolge der Buecher des aristotelischen Organons," *Abhandl. d. Berliner Akad.*, 1833.

traditional, the linguistic, the psychological, the epistemological, and the mathematical, speak different languages, and each regards the other as not really dealing with logic at all."

My second quotation is shorter. It is about the kind of logic which Aristotle taught. This I take from the chapter on "Logic" of the book *Aristotle* by Sir David Ross, the eminent English scholar who has done so much for the advancement of Aristotelian studies in our time:

"Aristotle has, though he does not explicitly discuss the question, a clear idea of the difference between logic and other studies with which it has sometimes been identified or confused—grammar, psychology, metaphysics."⁴

If we put these two statements side by side, we have on the one hand a list of the different types of modern logic—almost all of them dependent to a certain degree on Aristotle's original plan of a system of logic, but disagreeing with one another as to what logic is about—and on the other hand the inventor of the science with such a clear idea of its difference from other studies that he did not even think it necessary to discuss the question explicitly. Now, a modern logic is entitled to decide for itself what it ought to be about, and if this decision turns out to be in disagreement, not only with other types of modern logic but also with the ancient founder of this branch of science, the modern doctrine may nevertheless be consistent in itself. Naturally a modern logician may attack or try to correct Aristotle's views even with regard to the subject matter of logic. But a real difficulty arises if we concentrate on those types of modern logic which are in part or wholly in agreement with Aristotle's views as stated by Professor Ross. Scarcely anybody will maintain that such an agreement is mere coincidence, and no one, so far as I am aware, has done that. Let us suppose—as Professor Ross obviously supposes—that Aristotle and his modern followers are right in principle, in so far as they agree. Even then only a few modern logicians will be such spirited defenders of their logical creed as was Carl Prantl, the author of a much-used and exceedingly

⁴ *Op. cit.*, p. 21.

useful history of the logic of the ancient and medieval periods. Prantl saw, not mental, but moral defects wherever he believed he met with logical heresy. But today only a few logicians will find in themselves and at the same time presuppose in others so clear an idea of the difference between logic and the neighboring sciences that they can omit an objective discussion of the question as beneath their dignity. On the other hand, Aristotle must have had a pretty clear idea of what it was that he founded and must have presupposed such a clear idea in his audience, too; otherwise he would have discussed the difficulties. Are we to suppose, then, that Aristotle and his audience were so much superior to a modern professor and his modern audience that they saw clearly from the beginning what we, even after being instructed by Aristotle, cannot grasp without considerable mental effort? It looks that way, if we take seriously the implication of such statements as that of Professor Ross. In this case we do not even need to put the implication in plain words ourselves. At least as far as the difference between psychology and logic is concerned, Professor Ross's statement is based on the results of a laborious work on Aristotle's syllogistic by Heinrich Maier, published about forty years ago and mentioned by Professor Ross among those few recent books which he had found most helpful. Maier undertook his work confessedly in order to show that modern logic must go back to Aristotle and *learn* from him that logic and psychology are different things. According to Maier it was Aristotle's most remarkable achievement in the field of logic that he emancipated logic from psychology. This is puzzling. In the eighteen nineties, when Maier began his studies, we had a psychological school of logic, and the task of emancipation may at that time have been very urgent. But when Aristotle began his logical studies, there did not exist any comprehensive logical theory at all, certainly not a psychologically contaminated one. So it is a little difficult to imagine how Aristotle managed to emancipate logic from psychology and how we shall proceed in order to learn from him a solution of this problem, which he did not discuss and could not even have seen as we see it. On the other hand, there

can indeed be no doubt that Aristotle's logic is pure, practically free from psychological contamination, and that therefore in a way he anticipated the view of most up-to-date logicians that logic does not interest itself primarily with the ways in which our actual thinking is done. Permit me one more quotation from Cohen and Nagel's textbook:

"An old tradition defines logic as the science of the laws of thought. This goes back to a time when logic and psychology were not fully developed into separate sciences clearly distinguished from other branches of philosophy. But at present it is clear that any investigation into the laws or ways in which we actually think belongs to the field of psychology. The logical distinction between valid and invalid inference does not refer to the way we think—the process going on in someone's mind. The weight of evidence is not itself a temporal event . . ."⁵

Again, I have reason to be especially grateful for a clear formulation of the present situation, because it enables me to formulate easily what I think is a serious problem. Aristotle's time was certainly a time "when logic and psychology were not fully developed into separate sciences clearly distinguished from other branches of philosophy." Nevertheless, unlike many of his followers, Aristotle was able to teach surprisingly pure logic. What guidance did he have? How could he anticipate the subject matter of logic without noticing the difficulties and without having to wait for the future development of the different branches of philosophy? Where did he pick up the subject matter of his logic in such purity?

Now, I think, we are prepared to realize the importance of our knowledge that Aristotle's *Topics* was planned and elaborated earlier than his other treatises on syllogisms. There is no doubt that the notion of the syllogism was in the center of Aristotle's logical interests; and it is not the least of Heinrich Maier's merits that he emphasized this fact by choosing for his comprehensive work on Aristotle's logic the title "The Syllogistic of Aristotle." Aristotle's definition of a syllogism is well known: "A syllogism is an argument

⁵ *Op. cit.*, p. 18.

in which, certain things having been assumed, something other than these follows of necessity by virtue of the things assumed." It appears not only in the context of the *Prior Analytics* but also at the beginning of the *Topics*,⁶ in order to explain the subject matter of this work. Yet the aspect of the syllogism in the two treatises is entirely different. In the *Analytics* the definition of the syllogism is soon followed by the doctrine of the syllogistical figures, out of which everybody knows at least the main example :

All men are mortal,
Socrates is a man,
 therefore
Socrates is mortal.

In these Aristotelian chapters on the possible forms of the syllogism we have logic in its most formal appearance, not only looking but really being something like pure mathematics. Whoever has hoped to gain from logic some immediate use for his own thinking, must feel disappointed ; and that this does not happen to ordinary mortals only, is shown by the following remark that was found in Hegel's papers : "Concerning historical logic. It is being asserted that we judge : gold is yellow. This assertion is probable. But it is not equally probable that we are accustomed to reason in this way : all men are mortal, Gajus is a man, therefore he is mortal. I for my part have never thought such silly stuff. They say it comes to pass within us without our being conscious of it. It is true, many things come to pass within us, for instance excretions from the kidneys and the like ; but if these things come outside, we hold our noses. Just the same with such reasoning." So much is certain : anybody who begins his study of logic with Aristotle's *Prior Analytics* will soon find himself surrounded by strangely formal syllogisms and will be at a loss where to locate them in the world in which he lives.

⁶ The wording of the definition in the *Topics* (100a, 25) differs only very slightly from that in the *Prior Analytics* (24b, 18) ; the variance in the Oxford translation is misleading. For my purposes I chose a form that is adapted from Professor Ross's version (*Aristotle*, p. 21).

⁷ Translated by me from the German in K. Rosenkranz, *G. W. F. Hegels Leben* (1844), p. 538.

Thanks to the preservation of the *Topics* and the evidence for its relative chronology, we know that Aristotle himself did not start his researches on the syllogism according to the method used in the *Analytics*. The whole of the *Topics* deals with syllogisms, and it is not always very pleasant reading. But at least Aristotle states right from the beginning in the clearest way possible what it is all about, and throughout the whole work we are never left in doubt as to what purposes the new doctrine is intended to serve. After paying a little attention to the professed subject of the *Topics* it will be easy to locate the kind of syllogism that is involved.

The immediate purpose of Aristotle's course of lectures is one scarcely to be expected by any modern reader. For if we attend carefully to Aristotle's explanations in the early chapters of the *Topics*, we learn that he simply presupposes, as a matter of course and as a device commonly used, a curious kind of mental gymnastics. It consists in either arguing about a proposed problem—any debatable problem—from probable premises, or, if one is attacked in argument, in avoiding self-contradiction. For this kind of philosophic exercise there are always two persons required, plus a problem; one person has the part of questioner, the other person the part of respondent and opponent. The questioner first proposes a problem, the respondent chooses his position, and then the questioner has to take as his view that side of the problem which was repudiated by the respondent. Now the questioner must continue questioning and try to draw a conclusion or, we may say, get a syllogism in favor of his view from such answers as he is able to elicit from the interlocutor. The part of the respondent is more passive; but he has to be on his guard against such concessions as will enable the questioner to get his conclusion. For if the questioner gets his conclusion, the respondent is obviously the loser, since he will be forced to deny what at the beginning he asserted, or vice versa.

To establish a method for this artificial kind of argumentation is the immediate purpose of the *Topics*. "That the method will be useful for gymnastics," says Aristotle (101a, 28), "is self-evident.

For, having a method, we will with more ease succeed in attacking a given problem.”^a

Of course there are other uses for the method, too. Secondly, according to Aristotle, the method will enable us to argue with uneducated people on the basis of their own opinions. Thirdly, the power of arguing both ways will help us to see the truth in serious philosophical questions; moreover, being able to argue from popular opinions is the only way to discuss the first principles of sciences, which, as principles, cannot be derived scientifically from other principles. The second advantage listed by Aristotle cannot fail to remind us of Socrates’ ways of dealing with people, which Xenophon once (*Memor.* 4, 6, 15) described as follows: “If he himself was going to explain a thing, he started with premises most likely to be agreed upon, believing this to be the surest way of reasoning; and therefore he was more successful in winning the consent of his hearers than any one I ever knew.” And what Aristotle describes as the third benefit of dialectical proficiency describes exactly his own way of starting a philosophical discussion. But there is a difference in the relation of the *Topics* to the different benefits of its method. For the uses mentioned second and third the *Topics* provides only indirectly, namely, by furnishing its method for mental gymnastics; and mental gymnastics, in turn, if properly practiced, is supposed to prepare for the tasks of real life and philosophy. Within the *Topics* intercourse with uneducated people is scarcely considered further; and as to philosophy, whenever Aristotle mentions it and its subjects, he always draws a sharp line of division between its adequate procedure and the method taught in the *Topics*.

I cannot go into the details of this dialectical method, which is not immediately philosophical, but confessedly preparatory; but I shall mention merely that if you come from the *Analytics*, with its one rigid pattern of the perfect syllogism and the comparatively few permitted variations, you will be surprised by the bewildering

^a This is my translation.

polymorphism of what Aristotle in the *Topics* admits as syllogisms and tries hard to master methodically.

Nevertheless, as I said before, the definition of the syllogism is the same in the *Topics* as in the *Analytics*. Let us look at it again. "A syllogism is an argument in which, certain things having been assumed, something other than these follows of necessity by virtue of the things assumed." Now let us try to describe such a syllogism according to the conditions which Aristotle presupposes throughout the course of the *Topics*. First certain things have to be assumed; then something different comes out of them unavoidably. When and where does that happen?

As we have seen, a dialectical syllogism presupposes two persons—the questioner and the respondent. The questioner, of course, knows from the beginning what he is driving at, that assertion, affirmative or negative, which he is going to enforce upon his respondent. This is usually called a conclusion, but from the point of view of the questioner the conclusion is that which is there at the beginning, and literally so: τὸ ἐν ἀρχῇ, that which is at the beginning, Aristotle actually calls it when he comes to speak of the fallacy of begging the question, the *petitio principii* of traditional logic. Having already in mind the intended conclusion, the questioner has to look for suitable questions to ask of his opponent. These questions are the propositions of traditional logic—*protaseis* in Greek, that which is offered to the interlocutor so that he may accept it; as they are set forth first, whenever a syllogism is stated, such propositions are now usually called "premises."⁹ In the mind of the questioner the direction of thinking that leads to the finding of the syllogism is opposite to the order of the premises and the conclusion in the syllogism itself; the questioner has to do, in a way, his thinking backward from the conclusion to the premises, not, as we see the order in the syllogism, from the premises to the conclusion. The latter procedure is easy, for once you have assumed

⁹ As a version of *protasis* the Oxford translation favors "proposition" in the *Topics*, "premiss" in the *Analytics*.

the premises, you cannot avoid the conclusion. But beginning with the conclusion in order to find premises is an entirely different way of thinking, for which a method is badly needed. For it is certainly not quite so simple as, in a similar case, a humorist is said to have indicated to an inquisitive lady. She had asked him how he managed to have such funny ideas. "Oh, that is quite easy," he said, "first I sit down and laugh and then—I think backwards."

Now we turn to what happens in the mind of the respondent. He also knows the conclusion from the beginning, but is trying to avoid it and so has to be careful with his answers. On the other hand, according to the rules of the game, which Aristotle gives in full detail, he is supposed to answer with a certain degree of sincerity; he must not refuse to assent to opinions and convictions which may reasonably be upheld and which in fact agree with his own opinions and convictions, unless he can show that the meaning of a certain premise is immediately identical with the meaning of the conclusion. Thus, except when he has to reject a *petitio principii*, the answers of the respondent should be fairly objective, so as to give the questioner a chance. Now, if the questioner happens to be a good man arguing for a not-too-bad cause or a not-too-bad man arguing for a good cause, and if things go according to his intentions, the result will be a syllogism produced in the mind of the respondent. First the respondent cannot but accept the suggested premises, and then—if the questioner is skillful—he finds himself in a trap: the questioner draws the conclusion as a necessary consequence of the premises, and the respondent has to face defeat, for after the assumption of the premises there is no denying the conclusion and no further reasoning against it. Incidentally, Aristotle advises the questioner not to put the conclusion in the form of a question, in order to prevent any unfairness on the part of the respondent.

We need not go into further detail; at any rate, we have found a real syllogism developing exactly according to the Aristotelian definition; not only that, but we know also—for simple chrono-

logical reasons, at least—that it was this kind of syllogistic practice, not the abstract forms of the syllogistical figures, which was in Aristotle's mind when he first formulated his definition.

A syllogism brought about by a clever questioner in the mind of the respondent is, as far as we have considered it, a product of entirely artificial conditions. However, as we have seen, it does not lack psychological reality; it really happens in time and within a soul, that of the respondent. On the other hand, there is great difficulty in describing it in terms of an empirical science of psychology which tries to investigate the ways in which we actually think. For, indeed, usually we do *not* think in Aristotelian syllogisms. Modern logic gets rid of the difficulty—and of course is entitled to do so for its own nonhistorical purposes—by strictly distinguishing between propositions, and judgments in a special narrow sense, which is not usually observed, and by deciding that logic is concerned with propositions and their implications, not with judgments and the mental act of actually coming to conclusions. But in the case of the Aristotelian syllogism this distinction does not seem to make a great difference. Aristotle's position was sufficiently determined by the fact that in a normal Aristotelian syllogism the premises do not come into the mind as spontaneous judgments of a freely thinking or observing agent, but as already formulated propositions, and cleverly formulated ones too, from which there is no escape. In this situation there was no danger that logic might be contaminated by psychology, for even psychological observation could not furnish anything but the statement of the inevitability of the conclusion. The danger was rather in the opposite direction, and we know that for many centuries, beginning with Aristotle himself, logicians were inclined to substitute logic where psychology was required. But these were later developments.

We are concerned with the origin of the science of logic, and I think we have seen that the contents of the first systematic work on the subject have a claim to be considered first not merely for chronological reasons. Perhaps Aristotle was not so wrong in quoting a Greek saying equivalent to "the first start is the main part,"

although one may have one's doubts with regard to the amount of gratitude we owe him for this start. In any case the start itself demands a historical explanation, for the existence of such a game of mental gymnastics as we had to accept in order to understand the first textbook of logic, the *Topics*, seems even more puzzling than certain features of the developed Aristotelian logic in the *Analytics*. There can be no doubt that in Aristotle's school such a mental game was taken rather seriously. Otherwise Aristotle would not have spent so much time and hard work in preparing the *Topics* as the book shows he must have spent and as according to his own testimony he did spend. We feel puzzled and perhaps a little embarrassed, for Aristotle's sake ; but the explanation of the phenomenon is not so difficult as it might seem. The only thing needed is to recall a few well-known facts of the history of science and philosophy in Greece.

If without the help of tradition we had today to search science and philosophy for the subject matter of logic, where should we look? Well, science and philosophy are supposed to live in the minds and the researches of scientists, scholars, and philosophers, and the results of their mental labors are deposited in books. And besides, of course, we have academic teaching. But it would perhaps be a little, let us say, one-sided, to base our notions of logic mainly on the practices of academic teaching. Yet this is exactly what Aristotle did in his time. We know through certain passages in the later writings of Plato that in fact Plato was the inventor of the notion of mental gymnastics and that he introduced the practice into his school, the original "academy," as a compulsory preparation for future philosophers. What Aristotle added, for the convenience of his own school, to this educational practice was a systematic introduction: the *Topics*. Thus it happened that at the beginning of systematic logical research a syllogism was not sought and was not found among or within the thoughts of the solitary thinker or in his books or formal lectures, but that the original subject matter of logic was the "dialectical syllogism," the syllogism that develops in conversation.

The cultivation of the dialectic syllogism as an indispensable means of philosophic education is clearly an offspring of that period in the history of philosophy when the questions and answers of social conversation were a means and a field of new discoveries, when dialectic, the art of dealing with things in conversation, could appear to be almost identical with true philosophy and science, and when books and the pretensions of ready-made knowledge were held in suspicion. This was, of course, the period characterized by the names of Socrates and Plato. It was a short period: Plato's greatest disciple Aristotle was again an interested reader and confident writer of books. In the two generations before Aristotle trust in conversation, combined with mistrust of books and the like, was a new attitude; for in the Greek world of the fifth century, to which Socrates belonged, it had already become as natural as it is today to consult a book if you wanted to learn what a philosopher or scientist had to teach. For instance, according to Plato (*Apol.* 26d), Socrates replied to an accusation of atheism: "Friend Meletus, you think that you are accusing Anaxagoras: and you have but a bad opinion of the judges, if you fancy them illiterate to such a degree as not to know that these doctrines are to be found in the books of Anaxagoras the Clazomenian, which are full of them. [Young men could easily buy the books for a little money, and laugh at Socrates, if he pretended that these doctrines were his.]"¹⁰

But Socrates himself did not write books. His part in real life and in philosophy was that of the questioner, as Aristotle states in an interesting passage in the *Topics* (183b,7), in full awareness of the historical connection of Socrates' dialectic with the subject of the *Topics*. Without doubt Socrates' way of philosophizing orally was the basis of the dialectical practices in Plato's and Aristotle's schools. Plato, it is true, did write books, and we should not know much of value either of Socrates' views or of Plato's doctrines, if Plato, too, had declined to be a writer. Nevertheless it is also true

¹⁰ The interpretation of the Greek text is controversial. Instead of Jowett's translation, which is misleading, the bracketed paraphrase gives the meaning so far as it is practically certain.

that Plato did not believe in books and in continuous lectures as a means of arousing and propagating scientific and philosophic thinking; and it is not by chance that his books are written in the form of living conversation. Nor is it by chance that, at least in his earlier dialogues, the kind of conversation is exactly such as we should have to invent if we attempted to restore the natural prototypes of the artificial syllogisms of the *Topics*. So, here we find ourselves led to facts and literary documents which are so well known that this chapter on the origin of the science of logic may come to a close. There is no need to expatiate on Plato's regard for the dialectic *form* of reasoning. But I should like to add a remark on the name "logic."

This name does not appear in extant ancient literature before the first century B.C.; Aristotle does not use it. It is derived from the Greek word *logos*, which can mean "speech," but in addition many things connected with speech. In times when people believed they could find in logic methodical instruction concerning how to think or reason in general, usually one meaning of *logos* was exploited, namely, "reason," so that the name "logic" would mean an art or a science of reasoning or thinking. But that is certainly not a true etymology. Although Aristotle does not use the word "logic" as a noun, he has it as an adjective in certain functions which prove two things, firstly, that the later name of the science of logic goes back to Aristotle's use of the adjective, and, secondly, that this use of the adjective goes back to that meaning of *logos* or rather of the plural *logoi* which refers to an interchange of thoughts in speech—conversations, debates, arguments between people, especially such about subjects of philosophical interest. And thus we may say that even its name indicates that logic was originally conceived as a science of what happens, not when we are thinking for ourselves, but when we are talking and trying to convince one another.

CHAPTER II

CONCEPTS, TERMS, DEFINITIONS, IDEAS, CATEGORIES

AN UP-TO-DATE picture of the history of ancient logic is at best a hope for the future. I do not believe that at the present any living scholar has sufficient knowledge of the details of this history and of the historical connection of these details to draw the outlines clearly and in adequate proportions. A simple reason for this is of course the incompleteness of our documentary evidence; but perhaps we should not complain so much concerning the loss of the largest part of ancient logical literature as long as its most important part—undoubtedly to be found in the extant writings of Plato and Aristotle—remains problematical as to its original intentions. For it cannot be denied that owing to the noncommittal attitude of most classical scholars toward strictly philosophical subjects it is only recently that even a few attempts have been made to apply the modern art of philological interpretation to ancient logical texts, and we are still far from having reached comprehensive results.

Nevertheless, a reconsideration of the Greek foundations of traditional logic is possible, at least to a certain degree, even before a reliable history of Greek logic can be written. The whole structure and many details of traditional logic go back ultimately to treatises, chapters and more or less extensive passages in the extant classical literature, mainly and primarily to Aristotle and Plato; and the method of direct comparison is in many cases immediately available. Whether it will lead to noteworthy results cannot be predicted for any single case; but in general one part of logical doctrine should be easier to understand—and, if necessary, to criticize—if it is examined as it was first used and serving its original purpose than it is after it has been tampered with and adapted over and

over again to the wants and needs of later times. There is only one indispensable requirement : we must have learned to explain a given classic passage from a given classic context, instead of trying to explain it by simply substituting traditional modern notions for original old ones.

Until now textbooks of logic of the more conservative type have divided that part of their subject in which they confessedly follow Aristotle into three chapters : first, the logic of terms (or concepts), then the logic of propositions (or judgments), and as a culmination the logic of syllogisms. The principle of this arrangement is obviously that of progress from the simple toward the compound, and it has indeed some analogy in the traditional order of Aristotle's logical writings, where the three larger treatises on syllogisms—the *Prior* and *Posterior Analytics* and the *Topics*—are preceded by two short writings, the *Categories* and the so-called *De interpretatione*. The latter, the second in this order, may be said to deal with judgments as expressed in speech, and the first professes to be a treatment of the different meanings of words not combined into sentences. Incidentally, the singular "category" means originally simply predicate; but the plural "categories" could naturally be used in the sense of "different kinds or forms of predicates"; the full Aristotelian expression for what we call a "category" is "kind of category" or "form of category." Much trouble in the study of philosophy and of its development has been caused by the fact that students seemed to have to begin their study of Aristotle with a little book which treats predicates as if they were not predicates. We shall come back to this difficulty. For the moment we must confine ourselves to the statement that whoever was responsible for the traditional order of Aristotle's writings made the arrangement in the belief that the treatment of words not combined into sentences must precede the treatment of sentences (or judgments) and that single judgments must be treated before combinations of judgments into syllogisms.

There is no reason to blame the arrangement, which is probably older than the first century B.C. ; as an arrangement of manuscripts

or books that somehow had to be brought into a sequence, it is good enough. But whether the sequence makes or was intended to make an organic and unified body of logical doctrine is another question.

Aristotle's definition of the syllogism implies that a syllogism contains a certain combination of propositions (or "premises"), and in an explanation which he gives in the first chapter of the *Prior Analytics* he calls that into which a proposition is resolved *horos*, "term." Thus we get the sequence "term, proposition, syllogism," and it is this triad to which the three main parts, or the first three parts, of traditional logic are generally supposed to correspond, even when a different (but allegedly equivalent) terminology is preferred, like "concept, judgment, reasoning" in English, or *Begriff, Urteil, Schluss* in German, or, as the celebrated and influential French *Logique de Port-Royal*¹ had it, *idée, jugement, raisonnement*.²

Our first question, then, will be, whether Aristotle's logic was an organic tripartite body, as the division and the arrangement of the subject matter in countless not-quite-modern logical textbooks might seem to indicate. The answer is a short "no." For, though there must be some historical connection of the structure of traditional logic with the Aristotelian triad "terms, propositions, syllogisms" and with the ancient order of the books of the *Organon*, it is a fact—deservedly stressed in Heinrich Maier's *Syllogistik des Aristoteles*—that Aristotle's two *Analytics* and his *Topics*, all three concerned with syllogisms, do not presuppose any separate treatment of either propositions or terms. The *Analytics* and *Topics* occasionally make use of the doctrine of "categories," but they do not refer to the little treatise that is now the first of Aristotle's writings, and it is rather difficult to define the relation of its contents to the terms and propositions of Aristotle's syllogistic. The attempt to do so has caused many a headache to systematizers of

¹ First published at Paris in 1662. My quotations are taken from the English translation by Th. S. Baynes.

² For "The Three Parts of Logical Doctrine" and some reasons for and against this arrangement see § 6 of Keynes' *Formal Logic*, 4th ed., pp. 8 f. As to the modern terminological difficulties see *ibid.*, pp. 10, 66.

the Aristotelian *Organon*. The *De interpretatione* comes nearer to the postulate of a "second part of logic" devoted to judgments, but the fact is that the *Analytics* and the *Topics* teach about propositions everything necessary for their purposes and that they ignore the *De interpretatione* entirely.

Yet for reasons which I tried to explain at the beginning of this chapter I intend to take the first part of traditional logic first, no matter whether this is in harmony with Aristotle's views or not. So, let us for the present disregard propositions (or judgments) and syllogisms and look for the Greek foundations of that first part, where terms (or concepts) are to be considered as far as possible for their own sake, not yet connected so as to form and become parts of judgments or propositions.

There is no doubt that the book *Categories* is partly responsible for the contents of this first part of traditional logic, because it professes to deal with the significance of *unconnected* parts of sentences; but the *Topics*, our earliest document, not only of Aristotle's treatment of syllogisms but also of categories, shows that the doctrine of categories was originally a doctrine of sentence-predicates and was only later transformed by Aristotle himself into some scheme for pigeonholing whatever carries a single word as its name. The question of categories is an exceedingly complicated one, and we should rather begin with the other Aristotelian ingredient of the first part of traditional logic, the "term" of Aristotle's syllogistic, which, it must be remembered, was not the subject in Aristotle's treatment of a separate chapter or part of logic, as it is in traditional logic.

Of "term" we have this definition: "I call that a term into which the premiss is resolved, i.e. both the predicate and that of which it is predicated, 'being' being added and 'not being' removed, or vice versa" (*Anal. priora* 24b, 17). From Aristotle's practice in the *Analytics* we see that a term may be symbolized by a letter of the alphabet and that such a letter may indeed stand for anything that can appear either as subject or as predicate of a statement. The fact that it is often not a single word which corresponds to a single term

is duly emphasized by Aristotle himself : "We must not always seek to set out terms in a single word : for we shall often have complexes of words to which a single name is not given. Hence it is difficult to reduce syllogisms with such terms." After mentioning in this connection the mathematical demonstration that the angles of a triangle are equal to two right angles, he continues : "it is clear that the middle must not always be assumed to be an individual thing, but sometimes a complex of words, as happens in the case mentioned" (*Anal. pr.* I, ch. 35). For further exemplification we may take a chapter of the *Posterior Analytics* (I, 34). It is about quick wit (*εὐστοχία*) : "Quick wit is a faculty of hitting upon the middle term instantaneously. It would be exemplified by a man who saw that the moon has her bright side always turned towards the sun, and quickly grasped the cause of this, namely that she borrows her light from him ; or observed. . . . In all these instances he has seen the major and minor terms and then grasped the causes, the middle terms. Let A represent 'bright side turned sunward,' B 'lighted from the sun,' C the moon. Then B, 'lighted from the sun,' is predicable of C, the moon, and A, 'having her bright side towards the source of her light,' is predicable of B. So A is predicable of C through B." In another case Aristotle has to use eleven words for a single term, the Oxford translation twenty three (*Anal. post.* 93a, 37) : "let C be the moon, A eclipse, B the fact that the moon fails to produce shadows though she is full and though no visible body intervenes between us and her." Still, such terms as cannot be indicated by single names are obviously regarded as exceptions, and the usual thing, according to Aristotle, is a single name for a single term. But John Stuart Mill's attempt to simplify the facts beyond that and to make "terms" and "names" entirely commensurable scarcely serves an objective purpose, certainly not a historical one. For the "many-worded names" which he had to adopt³ in consequence of his equation of terms and names would be self-contradictory in Aristotle's language ; they would appear as "many-worded words" or "many-named names."

³ See his *System of Logic*, Book I, ch. II, § 2.

As the undeniable affinity of syllogistic terms to the single names furnished by common language was never exactly determined by Aristotle, similarly his statement concerning the relation of "terms" to a certain class of entities lacks precision. In chapter 27 of Book I of the *Prior Analytics* Aristotle acknowledges the fact that "of all the things which exist" some are not suitable to become predicates of normal syllogistic propositions (namely, individual beings, like the man Callias or Socrates), whereas others are incapable of becoming subjects of such propositions ("some things are themselves predicated of others, but nothing prior is predicated of them"); but "whatever lies between these limits can be spoken of in both ways: they may be stated of others and others of them," for example, man of Callias and animal of man. "And as a rule arguments and inquiries are concerned with these things."

Aristotle's outspoken unconcern for exact determination in the case of the relation of "things" and in the case of the relation of "names" to "terms" shows clearly that he had no idea of strictly basing the treatment of "terms" on a doctrine of either names or things; at the same time, the attempts of later systematizers, as well as their difficulties in both directions, are only too understandable.

There is a third possibility. Names are supposed to signify things, but in order to be understandable they presuppose units of thought attached to them equally in the mind of the speaker and of the hearer. "Terms" are names or, in some cases, complexes of names (Mill's "many-worded names"); therefore, wherever terms appear in a real syllogism, they certainly always have their corresponding simple or complex units of thought, which in English have been called "ideas" (notions, conceptions,) or "concepts." Now, since "names" are generally believed to be secondary to thoughts and, on the other hand, the things themselves are not immediately involved in logical operations, there seems to be a fairly strong case for basing the treatment of terms and of logic in general on a consideration of ideas (or concepts, and so forth). According to J. S. Mill, logicians from Descartes down to his own time had done exactly that: "To judge, was to put two ideas together, or to bring one idea under

another, or to compare two ideas, or to perceive the agreement or disagreement between two ideas : and the whole doctrine of Propositions, together with the theory of Reasoning (always necessarily founded on the theory of Propositions) was stated as if Ideas, or Conceptions, or whatever other term the writer preferred as a name for mental representations generally, constituted essentially the subject-matter and substance of those operations."⁴ Indeed, the *Port-Royal Logic* begins its first section as follows : "Since we cannot have any knowledge of that which is without us, save through the medium of ideas which are within us, the reflections which may be made on our ideas form perhaps the most important part of logic, since it is that which is the foundation of all the rest." Even today one may find "deductive logic" introduced as "based on the concept."⁵

Mill himself was strongly opposed to this view : "The notion that what is of primary importance to the logician in a proposition, is the relation between the two *ideas* corresponding to the subject and predicate, (instead of the relation between the two *phenomena* which they respectively express,) seems to me one of the most fatal errors ever introduced into the philosophy of Logic ; and the principal cause why the theory of the science has made such inconsiderable progress during the last two centuries." Insistence upon the undeniable fact that generally "propositions are not assertions respecting our ideas of things, but assertions respecting the things themselves" was his means of getting rid of inquiries into the mental act of judgment. We shall see in the next chapter that the absence of psychology in Aristotle's doctrine of judgments expressed in sentences is due to reasons different from Mill's arguments.

With regard to "names" Mill was not able to establish his method of avoiding psychological questions without anticipating his treatment of propositions. For while the relation of things for which truth is claimed in a proposition may be studied without determina-

⁴ *System of Logic*, Book I, ch. v, § 1, "Of the import of propositions"; compare Book I, ch. ii, § 1, "Of names."

⁵ Shaw, *Logic*, p. 14.

tion of what happens in the mind when a proposition is formulated or understood, the use of a name is so obviously—not only theoretically but also in many cases practically—dependent on what is attached to it in the mind of the speaker and the hearer that as soon as “names” are treated separately, without reference to their function as subject or predicate in a proposition, the psychological issue seems to become unavoidable.

Therefore it is only consistent that Mill had to refer to propositions even in his chapter “Of Names,” and on the other hand that the *Port-Royal Logic*, which aimed in its *première partie* at an independent foundation of logic, had to begin with a consideration of the mental act of conceiving and with ideas.

In Aristotle’s syllogistic the notion of “terms” is entirely dependent on the notion of a proposition and far too indefinite otherwise to require or even to tolerate a separate treatment of their mental equivalents. And since “names” were regarded by Aristotle as merely conventional signs for “sufferings of the soul,” which in turn are supposed to be “images” of things, “the same for all men,” and which were studied in his psychology (*De interpr.* 16a, 3 ff.), he seems to have seen no reason for a separate study of the mental correlates of names.

To explain the different attitude of the logicians so bitterly criticized by Mill is beyond the limits of my task; but it must be remarked that if Mill came nearer practically to Aristotle’s logic by eliminating psychological questions, he did so on his own responsibility, not on Aristotle’s.

Contrary to what we may have expected, Aristotle’s treatment of syllogistic terms appears not to have contributed much to the traditional logical doctrine of terms or names or concepts. For in Aristotle’s logic the practice of defining has no such special and simple reference to syllogistic terms as it is supposed to have in traditional logic; Aristotle had no use for the “connotation” of a “term.” The relation of opinion or knowledge expressed in a definition to opinion or knowledge based on a syllogism is actually one of Aristotle’s own most troublesome problems. He attacked it differently in the *Topics*

and in the *Analytics*, and his final solution is too complicated to be dealt with here in a few words. But the problem as such was merely a consequence of the fact that a doctrine of definitions was already in existence when Aristotle developed his syllogistic on independent principles.

It is well known that Aristotle himself named Socrates as the inventor of general definitions. Incidentally, this is not in contradiction to his self-praise at the end of the *Topics*, which did not, of course, mean that there had not been any achievements of logical training before his own; what he claimed for himself was no more or less than a systematic treatment of syllogisms. In recent times Socrates' place in the history of logic, or if we insist on taking logic as a systematic science, in the history of what later became an ingredient of logic, has become more and more problematic; for it seems now that Aristotle's notions of Socrates' achievements in the field of ethics and of logic were derived to a large extent from Plato's earlier dialogues. This, of course, makes it difficult to decide how much of a logician the historical Socrates was. But, perhaps, in view of our own limited objectives we need not worry about this problem. Plato's dialogues, particularly the earlier ones, are works of the highest art; that is, they carry their explanation within themselves, and this refers especially to what I should like to call the logical situation under which questions are asked and answers given—just what we are searching for in order to understand the logical achievements. For this purpose it is not so important whether it was the historical Socrates or Plato in his earlier dialogues who brought about the logical situations from which the logical doctrine of definitions originated. But there is one difficulty which must be considered at this point. In Plato's philosophy the notion of a definition is somehow connected with the Platonic notion of "ideas." One is now supposed not to be understandable without the other. I do not think that it is as bad as that, but we have to face the problem.

First we shall have to state some terminological facts that are too often overlooked. Aristotle's word for the syllogistical "term" is *horos*; this sense of *horos* was derived by him from its use in mathematics, where it meant any of the members composing a mathemati-

cal proportion. Similarly, a syllogistic *horos* is one of the two members which constitute a proposition or of the three elements constituting a syllogism. Both the mathematical and the syllogistic sense are preserved in special meanings of the English word "term" and adequately listed in English dictionaries. But there is a third use of the word "term" in English, which must be completely ignored in dealing with Aristotelian logical terms: a syllogistic term is by no means capable of being understood or interpreted as "a word or expression having a precisely limited meaning."⁶ A syllogistic *horos* is not necessarily one word, and what is limited (determined)—*horos* means limit—is in this case the proposition, not, of course, its two "limits" (terms) themselves.

Another and worse source of trouble is a double meaning of the Greek word *horos* in the very field of logic. As we have seen, in its syllogistic use *horos* ("term") is so void of substantial meaning that a letter of the alphabet is a fully equivalent substitute. Now *horos* is also one of the words that Aristotle used in order to signify "definition" or the most precise answer that can be given when one is asked "What is this or that?" The two different significations are entirely independent of one another and were never mixed up by Aristotle himself. But unfortunately no less a scholar than Carl Prantl, who admired Aristotle's metaphysics and hated traditional logic, based his picture of Aristotle's logic on this homonymy.⁷ In his eagerness to demonstrate that Aristotle's logic was exempt from the blame of being "formal" he identified the empty syllogistic *horos* ("term") with the metaphysical correlate of *horos* in the sense of definition ("*Begriff*" in Prantl's German). The result was a disastrous confusion, which continues to influence modern notions of ancient logic. Although the theoretical—and emotional—values which Prantl attached to the "*Begriff*" have generally been forgotten since he wrote, it is still necessary to emphasize that an Aristotelian syllogistic term has neither a terminological nor a definite systematical relation to *horos* in the sense of definition.

The word "concept" (or "conception," in German *Begriff*) goes

⁶ Webster's *Collegiate Dictionary*, s.v. "term" 4.

⁷ See, for instance, *Geschichte der Logik im Abendlande*, I, 271.

back to Latin comments on the first chapter of Aristotle's *De interpretatione*,⁸ and it meant originally a notion of a thing produced by the thing in the soul and indicated by a word. It has no Greek equivalent and no original relation to definition. But historians of philosophy incline to a special usage, in which "concept" must be understood as an exact correlate to definition. As the English translator of a book by the late Julius Stenzel recently found it necessary to explain, "The 'concept' is that which we comprehend when we know a definition."⁹ This usage can be justified, but only in the following way. According to our Greek sources either Socrates or Plato started asking "What is this or that?" with a special emphasis that led to the notion and the doctrine of definition. Now, in a report on this beginning in philosophy there is often use for a noun that indicates the aim of questions like "What is virtue?" "What is the pious?" "What is a bee?" "What is fire?" In Greek it is possible to transform such a question into the required noun by simply adding the definite article ("the what-is-it" or even "the what-was-it-for-it-to-be-it"¹⁰), but we cannot imitate that. So a special noun is needed, and "concept" will do no harm as long as it is kept free from any syllogistic or metaphysical or psychological implication. But it must, then, really mean no more and no less than just what "we comprehend when we know a definition," and in this sense we shall use it from now on.

Traditional logic has its traditional view of its own history. "Both historically, as in the case of Socrates, and theoretically logic begins with the concept."¹¹ If we stick to that meaning of "concept" which was given to it for historical purposes and has just been explained, it makes good sense to let logic begin historically with the concept, and as we have already stated it is not so important for our purpose whether it was the historic or the Platonic Socrates who started asking with particular emphasis "What is it?" But with regard to

⁸ Prantl, *op. cit.*, I, 691; III, 206; and elsewhere (see the index of Vol. III s.v. "conceptus.")

⁹ Plato's *Method of Dialectic*, Preface, p. vi.

¹⁰ For a recent investigation of these terms see Curt Arpe, *Das τί τίς ἐστιν* bei Aristoteles, Hamburg Dissertation, 1938.

¹¹ Shaw, *Logic*, p. 17.

the "concept" of the second part of the statement (with which traditional logic begins *theoretically*), it is important to know that it was not there at the beginning, but is rather a late product of the complicated historical development during which Aristotle's logic was systematized in a non-Aristotelian way.

We turn back now to the question of the relation of definitions and Platonic "ideas," or, as we now may call it with a clear conscience, to the problem of "ideas" and "concepts" in Plato's philosophy.

The common historical view that Socrates went in for "concepts" in a reasonable and understandable way, and that later, for specifically Platonic and not generally understandable reasons, "concepts" were "hypostatized" so as to become Platonic "ideas" is nothing but a modernized form of Aristotle's historical reconstruction, repeatedly set forth in his *Metaphysics* (987a, 29 ff., 1078b, 12 ff., 1086a, 31 ff.). In Aristotle's language Socrates was "seeking the 'what (a thing) is,' " or the 'universal.' He was the first who "set his mind on definitions" or "sought to define universally"; but he did not "separate" universals or universal definitions from the single real things to which they referred, and, according to Aristotle, he was right in not doing so. But then Plato and his school performed this separation and for a reason of their own put imaginary eternal things beside the real transitory things (cp. *Metaph.* 997b, 5-10). They argued, if we take Aristotle's word for it, that a general definition cannot be concerned with a sensible thing, because sensible things are subject to change and therefore cannot be known in the way a definition makes one know a thing. As to the number of things, of which Plato and his school assumed "ideas," Aristotle asserts that they were compelled to make this assumption with regard to "almost everything universally said."

Thus it is no less an authority than Aristotle who upholds the opinion that in Plato's philosophy definable things are generally not the ordinary things, but something else, namely, "ideas." It is true, too, that Plato has not written a word to preclude such an assumption.

On the other hand, it is easy to criticize Plato for having unneces-

sarily "separated universals"—or "hypostatized concepts"—and Aristotle himself has done it so effectively that his description of the theory of ideas, particularly the account of its origin, does not sound very convincing.

So, not long ago we heard a different story. Thinking by means of "ideas," we have been told (and today many believe it), is more primitive and more adequate to the Greek mind than being interested in "concepts"; and the development of Plato's philosophy was not a preposterous change from already established rational "concepts" to irrational "ideas," but on the contrary a rationalizing progress from "ideas" toward "concepts." Or in words of the English translation of Julius Stenzel's book on Plato's dialectic: "Plato does not have to fight his way to the Ideal—that comes naturally to his spirit—but to something that seems to the modern mind vastly simpler—to the concept."¹²

I had to mention this modern story of the development of Plato's philosophy, because it is new; but we may disregard it from now on because it is incompatible with undeniable facts. We know today for certain that it was Plato's dialogue *Phaedo* in which the theory of ideas was revealed to the reading public for the first time; and it has never been a secret that the dialogue *Meno* was written earlier, since the *Phaedo* contains a practically undisguised quotation from certain chapters of the *Meno*. Of all the Platonic writings it is particularly the dialogue *Meno* in which the "Socratic" question "What is this or that?" is explained most lucidly as a request for a normal universal definition, whereas elsewhere in Plato the same question may be aiming, not at an ordinary concept, but at a transcendent Platonic idea. But the chronological relation of the *Meno* and the *Phaedo* does not permit any doubt that Plato knew how to look for a normal definition, or, in other words, knew of the "concept" before there had been any mention of "ideas" in the special Platonic sense—which, incidentally, the Greek words *eidos* and *idea* did not refer to at the beginning, even where Plato used them in connection with the question "What is it?"

¹² *Plato's Method of Dialectic*, p. 55.

Without going into details one may assert that all the examples of definitions and attempts at definitions in the *Meno* do not diverge in any way from the Aristotelian and traditional logic. Certainly there is nothing in the *Meno* to indicate that the object of questions like What is a bee? What is color? What is virtue? is a mysterious something, apart and different from the many common things called bees, colors, virtues, and so forth. There are no postulates in the *Meno* regarding definitions and their objects that Aristotle or we ourselves would hesitate to accept; on the contrary it is obvious that Aristotle's and our own notions of an orderly definition are derived to a considerable extent directly or indirectly from the *Meno* and the other closely related Platonic dialogues, such as the *Laches* and the *Charmides*.

On the other hand, there can be no doubt that Plato wrote the *Phaedo* in the conviction that he possessed striking evidence for certain "ideas" separate from the many things of which the names of the ideas may be predicated. So we are still confronted with the old problem: Why a doctrine of "ideas," although the doctrine of concept-definitions, which later became traditional, had already been initiated?

Plato's theory of ideas has its political, moral, educational, mathematical, physical, metaphysical and religious aspects, each of special appeal to different readers of Plato and consequently all discussed repeatedly. But there is also a logical aspect of "ideas," or at least it was there when Plato first established his new theory of knowledge. Later this original aspect was entirely obscured by Plato himself, and therefore the logical secret at the basis of the theory of "ideas" has been overlooked generally ever since the time of Aristotle's criticisms.

The fundamental thesis of the theory of ideas consists in the assertion that a single idea as such is something apart and different from all the many things which occur in common experience, and which may take, in the common usage of language, the name of the idea as a proper predicate. This opposition of the one "idea" to the many things of ordinary life is usually expressed by the term

"itself," and phrases like "itself, what it is," "itself by itself"; and, as is only too well known, it was just this assumption that an "idea" had a self of its own which was rejected by Aristotle not only as inconceivable but also as quite superfluous for the purpose of thinking and arguing about the things of the real world and real life. One passage of Aristotle's *Metaphysics* will be sufficient to illustrate the general tenor of his attacks: "While the ideal theory presents difficulties in many ways, the most paradoxical thing of all is the statement that there are certain things besides those in the material universe, and that these are the same as sensible things except that they are eternal while the latter are perishable. For they say there is a man-in-himself and a horse-in-itself and health-in-itself, with no further qualification,—a procedure like that of the people who said there are gods, but in human form. For they were positing nothing but eternal men, nor are the Platonists making the Forms (εἰδῆ) anything other than eternal sensible things" (*Metaph.* 997b, 5 ff.).

But, thanks to modern inquiries into the chronology of Plato's writings, we know today that Plato's theory of ideas had originally no relation to such "sensible things" as man and horse—Platonic examples would be: man, bull, fire, water (*Parm.* 130c, *Phileb.* 15a), finger (*Rep.* 523c), iron, silver (*Phaedr.* 263a)—but that the ideas first taken into consideration were moral predicates like just, good, pious, fair—fair (beautiful) also in the aesthetic sense—and also mathematical predicates like equal, larger, smaller, one, two. In speech these two groups of ideas are primarily expressed by adjectives whose normal function is to describe the things of common experience, not to denote them immediately. In such cases the terminological "itself" has an easy and quite natural meaning; the "ideas" are thought of as potential predicates, and the "itself" opposes them to those things of which they may be said. If we are asked "What is the pious?" the description of one or two definite actions that are asserted to be pious will not be a satisfying answer, because the question was concerned with the predicate pious *itself*, not with any of its many real examples (*Euthyphro* 6d); the "equal itself" is in opposition to equal stones or equal pieces of wood

(*Phaedo* 74a); and the "beautiful itself" is thought of as obviously different from the many beautiful people or horses or garments (*Phaedo* 78d).

It is in consequence of the arguments of the *Phaedo* that the terminological "itself," which marks a Platonic "idea," came to denote something superior to the many things of the sensible world and something perceptible by the mind only; but at the basis of the new theory of knowledge is the simple logical postulate that we are entitled to ask for definitions of the "just itself" or the "equal itself" as opposed to the many possible subjects of such predicates.

The logical situation in which such questioning is legitimate is clearly pictured in the beginning of the little dialogue *Euthyphro*, where Socrates, indicted on the charge of impiety and allegedly engrossed in his defense, asks a theologian what the pious and the impious are. The pious and the impious, he argues, must be identical each with itself in all the single cases of pious or impious action. So what he wants to learn is not a description of one or two of the many cases of pious action, as the theologian appears to have understood his question; what he needs is rather to be taught what that one quality itself is which makes all pious actions to be pious; "and then" he explains "I shall have a standard to which I may look, and by which I may measure actions, whether yours or those of anyone else, and then I shall be able to say that such and such an action is pious, such another impious." Socrates' request is quite natural and logically justified. Yet it is not a "universal," or "concept," as it is usually understood, that he is asking for. The definition of an ordinary universal is supposed to be found by comparison of given individual cases, not to be sought as a standard of problematic cases; but at first an "idea" was sought after for just this latter purpose.

This genuinely logical difference of the original "ideas" from ordinary concepts is the basis of the whole doctrine; and so much and no more is taken for granted in the *Phaedo* at the very beginning of the discussion of "ideas" (see *Phaedo* 65d and 74a). The further development, beginning with the arguments in the dialogue

Phaedo itself, was in my opinion decidedly illogical, especially when at a later time Plato began to state "ideas" (instead of or in addition to "concepts") of corporeal things, either artificial ones like shuttle and bed and chair (this not quite seriously and only episodic) or (and this in full earnest) natural ones like man, bull, water, fire. It was then that the theory became involved in the most serious logical difficulties and exposed to the well-known violent attacks.

The underlying simple logical fact, however, namely, that originally an idea corresponded only to a "what-is-it" question that asked for certain predicates, by no means to a "what-is-it" question with regard to a corporeal thing in the narrower sense of the word "thing," is habitually overlooked or misinterpreted by the interpreters of Plato's thought. We shall have to revise many of the traditional and the modern explanations (and translations) from this point of view. But I must conclude my remarks on concepts and ideas by simply mentioning one more fact, namely, that even after extending the scope of the theory of ideas Plato still was aware of concepts in addition to ideas, and that at that very time he worked out a new method of hunting concept-definitions by "division," to which Aristotle and traditional logic are equally obliged. For it was Plato, not Aristotle, who laid the foundations of most of the things that traditional logic places under the headings "definition" and "classification." But the logical conditions under which in Plato's latest philosophy concepts and ideas stood side by side are so complicated that so far no one has been able to describe them. The dependence of Plato's concept logic on his theory of ideas is usually overemphasized; in my opinion, there was even less genuine dependence than Plato himself believed.

Now a few words about "categories!" Plato's failure to differentiate properly between predicates like just, beautiful, equal, and things in the narrower sense when he extended his theory of ideas beyond its original scope is one example among others of a still very incomplete awareness of the manifold and complicated ways in

which the words of a language are related to and said of things, either in or out of sentences. The stock of grammatical, logical, psychological, and ontological observations with which today even the beginner is supposed to be acquainted did not yet exist, or existed only to a very limited extent; and generally, in the philosophy of the first half of the fourth century B.C., confusion was the result of too few rather than of too many distinctions. From this point of view Aristotle's distinction of as many as ten different classes or forms of predication was certainly a step forward in the development of logic and philosophy.

As we learn from the *Topics*, it was the original function of the list of different "categories" to protect against fallacies and mistakes caused by the similar linguistic form of different predications. For instance, "enjoying health" is in Greek expressed by a verb in the active voice (*hygiainein*), and so is "building a house" (*oikodomein*); and yet only the latter means an action of the subject of which it is predicated, whereas the former, according to Aristotle (166b, 16), means, in spite of the verbal form, not an action, but a disposition or a quality of its subject. In the case of the sentences: "Callias is (a)¹⁸ man," "Callias is white," "Callias is six feet high," the first predicate, "is man," indicates *what* Callias is in the strictest sense, and that implies his being an individual thing or a "substance" (as it is now usually called). The second predicate, "is white," indicates a quality, not a substance. The third, "six feet high," indicates a quantity, not a substance or a quality. Substance, quantity, quality are the first three members in the list of the ten "categories"; the other members show their respective subjects in the following seven aspects: "in relation to something," "somewhere," "at some time," "in some position," "having," "doing," "suffering." The relevant passages of the *Topics* combined with some passages in other Aristotelian writings leave no doubt that this list was found by comparing and distinguishing sentences with the

¹⁸ In Greek the sentences have exactly the same external form, because in Greek there is no indefinite article.

most familiar and at the same time most many-sided subject possible, a human being.¹⁴

In this early form the doctrine is easy to understand, and experiments which furnish the ten marks of distinction are easy to perform. Aristotle's result may be uncertain with regard to some of the single members and to the completeness of the enumeration, but the underlying principle, by which emphasis is laid on ontological differences of linguistically similar predications, is scarcely objectionable. There is only one complication, of which, however, Aristotle was fully aware without being disturbed by it. If the experimental sentence subject is *not* an independent individual thing or being, then a predicate saying *what* it is (essence) will of course not imply the "first category" (substance), but one of the other categories.¹⁵ I have mentioned this detail because Aristotle's remarks regarding that seeming inconsistency are most instructive and show better than anything else the narrow basis of the doctrine

¹⁴ Of the 21 examples of different "categories" which the book *Categories* offers, only 5 (horse, double, half, yesterday, last year) would be out of place in a sentence with a man (or child) as subject. *Categ.* 1b, 27: "To sketch my meaning roughly, examples of substance are 'man' or 'the horse,' of quantity, such terms as 'two cubits long' or 'three cubits long,' of quality, such attributes as 'white,' 'grammatical' 'Double,' 'half,' 'greater,' fall under the category of relation; 'in the market place,' 'in the Lyceum,' under that of place; 'yesterday,' 'last year,' under that of time. 'Lying,' 'sitting,' are terms indicating position; 'shod,' 'armed,' state; 'to lance,' 'to cauterize,' action; 'to be lanced,' 'to be cauterized,' affection"

¹⁵ *Topics*, 103b, 27: "It is clear, too, on the face of it that the man who signifies something's essence"—"essence" is in Greek "the what-is-it"; but "the what-is-it" can also be the equivalent of "substance"; it depends entirely on the context—"signifies sometimes a substance, sometimes a quality, sometimes some one of the other types of predicate. For when a man is set before him and he says that what is set there is 'a man' or 'an animal,' he states its essence and signifies a substance; but when a white colour is set before him and he says that what is set there is 'white' or is 'a colour,' he states its essence and signifies a quality. Likewise, also, if a magnitude of a cubit be set before him and he says that what is set there is a magnitude of a cubit, he will be describing its essence and signifying a quantity. Likewise, also, in the other cases . . ." Compare *Metaph.* 1030a, 22: "The 'what' belongs in the full sense to substance, but in a limited sense to the other categories. For even of a quality we might ask what it is, so that a quality also is a 'what,'—not in the full sense, however, but just as, in the case of that which is not, some say, emphasizing the linguistic form, that that which is not *is*—not *is* simply, but *is non-existent*."

of categories: predications of an individual thing, preferably a human being.

Like Plato's ideas, Aristotle's categories are commonly known, not as their discoverer had first constituted them, but in a function that is almost contradictory to their original constitution. In textbooks of logic the Aristotelian categories are not usually interpreted¹⁶ as a due and timely attempt to differentiate, for certain dialectical and philosophical purposes, the sometimes misleading uniformity of grammatical predication; but frequently they have been understood in a nearly opposite sense, namely, as an arbitrary and superficial survey of classes or general heads to which Aristotle—in the words of the *Port-Royal Logic* (Part I, chap. iii)—“chose to reduce”—*a voulu réduire*—“all the objects of our thought,” or, as Mill has it “into which, according to this school of philosophy, Things in general might be reduced.”¹⁷ And in this case, too, the discoverer himself is responsible for the abandonment of his original point of view. For it is undeniable that in various writings of Aristotle a more or less complete enumeration of the “categories” is used as a conveniently compendious inventory of the main aspects of reality and that used in this way the list of categories lacks a rational principle and is open to serious objections, which logicians have not failed to stress with undisguised contempt.¹⁸ At least this much is proved by the mere bulk of philosophical and philological literature against and in favor of Aristotle's categories, that in their

¹⁶ But see the interesting note added in the eighth edition of Mill's *System of Logic* to Book I, ch. iii, §1, which contains, in a way, the whole problem and its solution.

¹⁷ *System of Logic*, Book I, ch. iii, § 1.

¹⁸ One example (Mill, *loc. cit.*): “The imperfections of this classification are too obvious to require, and its merits are not sufficient to reward, a minute examination. It is a mere catalogue of the distinctions rudely marked out by the language of familiar life, with little or no attempt to penetrate, by philosophic analysis, to the *rationale* even of those common distinctions. Such an analysis, however superficially conducted, would have shown the enumeration to be both redundant and defective. Some objects are omitted, and others repeated several times under different heads. It is like a division of animals into men, quadrupeds, horses, asses, and ponies . . .”

later application by Aristotle to "things in general," the categories are difficult to account for. We may well ask why.

This question leads us back to the little treatise *Categories*, which is now the first in order of Aristotle's writings.¹⁹ It contains, on the basis of a short but very interesting preparatory section (chaps. i-iii), which one might call more logical than ontological, a minute description of the first four categories (substance, quantity, relation, and quality), in which an ontological point of view seems to prevail. The doctrine here revealed is far from the flexible subtleties of Aristotle's fully developed metaphysics, but there are some striking coincidences with statements otherwise peculiar to the *Topics*; and the conclusion that the treatise *Categories* was a comparatively early work by Aristotle himself is fairly safe.

In any case, even without reference to the question of authorship and chronology it can be stated that nowhere else in Aristotle's writings is the source of the difficulties which are inherent in the later form of the doctrine so transparent as here. The book explains its subject in the following way. Assuming that there are "things which are said," it divides them into two groups (1a, 16-19): some "are said" in sentence composition, for example "(a) man runs," "(a) man wins," others "are said" without such composition, for example, "man," "ox," "runs," "wins." Now, each of these latter things—which "are said" out of sentence composition and, accordingly, without being either true or false—signifies one of the ten categories (substance or quality or quantity, and so forth). This looks at first sight as if the author were going to classify the significations of all uncombined words of language and as if the mention of sentences was merely complementary. But in fact nothing but the ten classes of sentence predicates is presented to the reader, and the actual function of the mention of sentences (previous to "things said *without* sentence composition") is to direct his attention exclusively to such "things said" as may be constituents of

¹⁹ We are concerned exclusively with its main part chs. i-ix), a carefully planned, but never finished treatise; the second part is added by a redactor who betrays the unfinished state of the original manuscript on categories in words of his own at the end of ch. ix (11b, 8-14; see the Greek text).

sentences like "man runs," and "man wins." Thus, there is actually no extension of the doctrine beyond its original limited subject matter; the only real difference is that things like "man," and "ox" may now be understood as sentence subjects, whereas in the original form of the doctrine the signification of the first category was derived from the meaning that predicates like "is (a) man" and "is (a) horse" display as soon as they are opposed to and compared with predicates like "is white" and "is six feet high."

Yet the historical importance of this seemingly slight change in the presentation of the doctrine of categories can scarcely be overestimated. For, if nothing else, the illusion is certainly created that the ten classes of categories had been intended from the beginning and might be used, without scruple or further investigation, to cover the whole field of the possible signification of single words; and this is something that in ancient times, without modern transcendentalism and without modern psychology, nobody could in the long run keep distinguished from the field of "things in general." Because of the almost exclusive predominance of the treatise *Categories* in the development of traditional logic it is not necessary for us to consider, in their own aspect, the passages in undoubtedly Aristotelian writings, where use is made of the doctrine of categories in a wider sense than the original sense; but the complete lack of a new discussion of its principle of enumeration shows clearly that Aristotle himself was the first victim of such an illusion.

W. D. Ross states the case of the categories as follows: "There has been much controversy as to the meaning of the doctrine, largely owing to the fact that we nowhere in Aristotle see it in the making."²⁰ And: "These categories—some or all of them—appear in almost every one of Aristotle's works, and the doctrine is everywhere treated as something already established."²¹ The latter statement is true, and yet the former is incorrect. Although everywhere, even in the notoriously early *Topics*, the "doctrine is treated as something already established," we do see it in the making, because

²⁰ *Aristotle*, p. 22.

²¹ *Ibid.*, pp. 21 f.

in the *Topics* the doctrine appears in a simpler form and with a more natural function than anywhere else. Some controversy could be spared, if historians²² and critics of the doctrine of categories would begin with its earliest document.

²² F. A. Trendelenburg wrote a *Geschichte der Kategorienlehre* (*Historische Beiträge zur Philosophie*, Erster Band, Berlin 1846), in which the historical task is formulated in a masterly way. But although more than half the book is devoted to Aristotle, the result of this treatment of Aristotle's categories is much more confusing than the single Aristotelian texts, simply because, in dealing with Aristotle's writings, the author followed a merely synoptical method.

CHAPTER III

JUDGMENTS, SUBJECT AND PREDICATE

WE ARE TRYING to consider such pieces of ancient logical doctrine as have become foundations of traditional logic and, through traditional logic, either objects of reference or targets of attacks on the part of other modern schools of logic. In order not to lose our bearings it will again be necessary to begin with some quotations from modern books ; it goes almost without saying that this is not meant to be an exhaustive view of possible opinions or opinions actually held ; for my purpose a few different aspects of what traditional logic deals with in its second part will be sufficient.

According to the *Port-Royal Logic*, first published in 1662, logic or the art of thinking consists in the reflections which men have made on the four principal operations of the mind : conceiving, judging, reasoning, and disposing (*concevoir, juger, raisonner, et ordonner*). The subject of the second part of logic is defined as follows : 'Judgment is that operation of the mind through which, joining different ideas together, it affirms or denies the one of the other ; as when for instance, having the ideas of earth and roundness, it affirms or denies of the earth that it is round.'¹ Let me for the sake of a more complete impression add the definition of the subject of the third part : reasoning is, according to the *Port-Royal Logic*, "that operation of the mind through which it forms one judgment from a plurality of others ; as when, for instance, having judged that true virtue is to be referred to God, and that the virtue of the heathens was not referred to him, we thence conclude that the virtue of the heathens was not true virtue."²

Now I shall quote a conservative American textbook of logic, according to which "the Judgment forms the second part of logic"³ ;

¹ *Op. cit.* (in Baynes' translation), Introduction.

² *Ibid.* ³ Shaw, *Logic*, p. 71.

consequently, throughout the second part of the book, what is dealt with is called "judgments." But in the beginning of the third "part of logic" we learn of a change of names: "When we divide the syllogism into its constituent parts, we observe the familiar presence of concepts and judgments; only here they tend to lose much of their independence and become parts of a logical mechanism. The concepts become terms; the judgments, premises and conclusion."⁴ As to the expression "proposition," there is a reference in the index of the book: "Propositions (*see* Judgment)." Concerning concepts we learn also at the beginning of the second part that concepts, which in the first part have existed in their own right, become "terms" when the logic of the judgment is started. This way of dealing with the difference between concepts and judgments on the one hand and terms and propositions on the other hand is not so much an explanation as a description of what happens to be the custom of logicians.

In another of the more recent textbooks⁵ I find a chapter in which judgment is described as the most elementary functional unit of thought, which may be broken up into units of a different kind, structural units, which in the case of judgments or propositions would be terms and relations. Concerning the question whether the functional units of thought are to be called judgments or propositions, the author makes the following remark: "When a judgment is expressed in words it becomes a proposition, and propositions, like their subjective correlates, may also be called functional units of thought. Judgments may be private, but propositions, as written or spoken judgments, are public property; and it is for that reason that we will talk about propositions rather than judgments."⁶ I believe that the distinction that judgments may be private, whereas propositions are intended to be *proposed* to others (cf. above p. 14), is an essential one; but an essential difference of meaning should not be disguised as a different way of talking of almost the same thing.

⁴ *Ibid.*, p. 131.

⁵ Reiser, *Humanistic Logic for the Mind in Action*.

⁶ *Op. cit.*, p. 129

J. N. Keynes has a less perfunctory and less modernized treatment of the dilemma: "Shall we speak of the *judgment* or of the *proposition*?"⁷ I should like to quote from his "reasons and counter-reasons" the following: "On the one side, it is said that the use of the term *proposition* tends to confuse the sentence as a grammatical combination of words with the proposition as apprehended and intellectually affirmed; and it is urged that in treating of propositions the logician tends to become a mere grammarian.

"On the other side . . . it is urged that if we concentrate our attention on judgments without explicit regard to their expression in language, our treatment tends to become too psychological."⁸

If, finally, we consult the chapter "What is a Proposition?" in Cohen and Nagel's textbook, we find that in order to avoid being confused with grammar and psychology modern logic has given up the older definition of a proposition ("a judgment expressed in language") and has introduced an entirely different one. "Propositions are often confounded with the mental acts required to think them. This confusion is fostered by calling propositions "judgments," for the latter is an ambiguous term, sometimes denoting the mental act of judging, and sometimes referring to that which is judged. But just as we have distinguished the proposition (as the objective meaning) from the sentence which states it, so we must distinguish it from the act of the mind or the judgment which thinks it"⁹ (compare Mill's point of view, as quoted above p. 26).

Obviously it has become necessary, at present, to discuss in this connection the different claims of at least three different modern sciences, logic, grammar, and psychology. But since this is not our purpose, we had better turn back and see under what conditions ancient philosophers first raised the question of judgments (or propositions).

In Aristotle's treatises on syllogisms, the *Topics* and the *Analytics*, propositions and syllogisms are generally considered not as spontaneously coming to pass in the mind of a solitary thinker, but

⁷ *Studies and Exercises in Formal Logic*, p. 66.

⁸ *Ibid.*, p. 67.

⁹ *An Introduction to Logic and Scientific Method*, p. 28.

almost exclusively in that form in which they are caused in the minds of others by addressing them in speech. So there seems to have been little opportunity in these books for a deliberate distinction between judgments as mental actions and propositions; certainly there is no such distinction to be found there. It is only in the last chapter of the *Posterior Analytics* that conditions are different. Here it is asked how we arrive at those primary premises with which, according to Aristotle, science must begin. Since they are indemonstrable, the syllogistic point of view has to be abandoned; and without the slightest hesitation Aristotle offers a psychological explanation of the process, quite aware that he is stating psychological facts, for in the midst of his attempts to make things as clear as the extreme difficulty of the case allows, he says positively: "And the soul is so constituted as to be capable of this process" (100a, 13). This is one of the very few passages in which Aristotle seems to base logic on psychology. He is not shocked at the idea, as a modern logician would be, but in his way of dealing with logic there is very seldom occasion to contaminate logic with psychological reflections. We shall soon have to consider another, or, perhaps, *the* other, exception to the rule.

In general Aristotle's syllogistic, that is his logic as far as it is concerned with syllogisms and the constituent parts of syllogisms, is consistent in itself. Not only the treatment of terms but also that of propositions is entirely subordinated to and dependent upon the doctrine of syllogisms. Nevertheless, if we had hoped that with Aristotle logic would be comparatively simple and easy to understand, we shall be disappointed in this case. For beside the syllogistical treatment of propositions in the *Topics* and the *Analytics* there is the little book *De interpretatione*, which deals with sentences in a different way; and if we take that into consideration, not a few of the difficulties that appear in the different views of later logicians seem to be anticipated. It is true that part of the contents of this book do not differ essentially from the treatment of propositions in the *Analytics* and may well be understood as a kind of appendix to that inquiry. But there is a residue which cannot be

explained in this way and certainly justifies separate treatment because it would indeed be incompatible with the method followed in both the *Topics* and the *Analytics*.

The title *De interpretatione* means "on the expression of thoughts in speech"; but the title is too general for the book's contents and is therefore misleading. Probably this title is the invention of a later period. But, as in other Aristotelian writings, the first lines of the text contain in a simple form an adequate description of what we have to expect. "First we must," says the author, "define the terms 'noun' and 'verb,' then the terms 'denial' and 'affirmation,' then 'proposition'" and 'sentence.'"¹⁰

Of these six subjects of the book three, namely, denial, affirmation, and proposition, belong obviously also to the subject matter of syllogistic; whereas according to our notions the other three, noun, verb, and sentence, would lie rather in the field of grammatical science. Indeed, after having given his definitions and explanations of noun, verb, and sentence in general, Aristotle continues as follows (17a, 1): "Every sentence has meaning. . . . Yet every sentence is not a proposition; only such are propositions as have in them either truth or falsity. Thus a prayer is a sentence, but is neither true nor false. Let us therefore dismiss all other types of sentence but the proposition, for this last concerns our present inquiry, whereas the investigation of the others belongs rather to the study of rhetoric or of poetry." We see that Aristotle is already doing exactly the same thing other logicians do: after having mentioned sentences in general they limit the concern of logic to sentences which may be either true or false and let another science investigate the other kinds of sentences.¹¹

In comparison let me quote one of our modern logicians: "Reasoning and argumentation are ordinarily presented through the

¹⁰ Modern usage permits the translation "proposition," but it should be noted that the Greek equivalent is here not *protasis* as in the *Topics* (see above p. 14), but *apophansis* ("enunciation" or "statement").

¹¹ Since in Aristotle's time grammar in the modern sense was not yet established, he names rhetoric "or" poetics; though his own works on these subjects show that these branches of study, too, were scarcely prepared to deal with strictly grammatical observations. See *Poetics*, chs. 20 f.; *Rhetoric*, III, ch. 5.

medium of sentences. But not every sentence is a logical proposition. Grammarians enumerate various types of sentences: declarative, exclamatory, interrogatory, optative, imperative and hortatory. But sentences which express a wish, which ask a question, which exclaim or which incite, do not enter directly into the processes of proof, and are therefore of secondary importance from the point of view of logic. We see, therefore, that only sentences which are true or false are subject matter for logic."¹² It is pleasant to see modern logic in such complete agreement with Aristotle, and I think the pleasure will only be intensified if we point out a slight difference, namely, that Aristotle could not have thought of dismissing from logic sentences which ask a question; for this is fully explained by the connection of Aristotelian logic with the questions and answers of Socratic dialogues. So here, at least, we seem to have found solid ground.

Yet it is here that the trouble begins. For if it is only too clear that the cocksureness of later logic in distinguishing between the concerns of logic and of grammar is merely traditional, with Aristotle himself the case is not so simple. It is clear that he must have had a certain point of view, when on the one hand he based his *De interpretatione* on grammatical definitions, and on the other hand refused to consider more than a very small part of the subject of grammar. Now, this point of view was not that of his treatises on the syllogism, for in these there is no use at all for a grammatical substructure. In other words, while we must admit that we have "logic" in the *De interpretatione*, it seems to be logic of a different kind from that which was certainly Aristotle's own discovery, the logic of syllogisms; the *De interpretatione* is not only actually not referred to in Aristotle's syllogistical writings, but at least in some parts, especially at the beginning, there seems to be some incommensurability of content. Why do we find here this (limited) interest in grammatical facts?

Now for the real trouble! Between the announcement of the six definitions and these definitions themselves Aristotle's *De interpre-*

¹² Reiser, *Humanistic Logic for the Mind in Action*, p. 132.

tatione has an introductory chapter, in which the author tries to do everything we might reasonably expect: he attempts to locate the subject matter of the little treatise, as exactly as possible, in this world of rational human beings. If one may call the source of endless quarrels a foundation, we could say that this chapter has become the foundation of a large part of the logical literature of all times. It is quoted below so that it may be read before I point out what in my opinion is problematical.

¶ Spoken words are the symbols of mental experience and written words are the symbols of spoken words. Just as all men have not the same writing, so all men have not the same speech sounds, but the mental experiences, which these directly symbolize, are the same for all, as also are those things of which our experiences are the images. This matter has, however, been discussed in my treatise about the soul, for it belongs to an investigation distinct from that which lies before us. As there are in the mind thoughts which do not involve truth or falsity, and also those which must be either true or false, so it is in speech. For truth and falsity imply combination and separation. Nouns and verbs, provided nothing is added, are like thoughts without combination or separation; 'man' and 'white,' as isolated terms, are not yet either true or false. In proof of this, consider the word 'goat-stag.' It has significance, but there is no truth or falsity about it, unless 'is' or 'is not' is added, either in the present or in some other tense."

Let us take first what is comparatively easy to formulate. Aristotle distinguishes clearly between the subject matter of psychology and the subject matter of his present inquiry, which we cannot but call a logical one. The likenesses of real things which are actualized in the soul are objects of psychological investigation, whereas the *De interpretatione* is concerned with the words and sentences of language in so far as they are symbols of these likenesses and through them of the things. But Aristotle does not do what most modern logicians would like to see him do. He does not say that the subject matter of logic is independent of the subject matter of psychology. On the contrary, according to him, words and sentences

are *only symbols* of what happens in the soul, and in particular the difference between sentences and single words is supposed to be understandable only as an analogy to the difference between certain kinds of thoughts. On the other hand, Aristotle's treatment of words and sentences in the *De interpretatione* no longer refers to and is no longer dependent upon the knowledge of the psychological facts. In short, the dependence of the subject matter of logic on the subject matter of psychology is expressly stated, but logical research is kept entirely independent, obviously with no hesitation whatsoever.

Secondly, at the outset we seem to have a simple series of four members: written words, spoken words, likenesses of things in the soul, things. Written words we may disregard because Aristotle mentions them only in order to illustrate the conventional character of such symbols; the implication is that spoken words, too, are merely conventional symbols. Words are symbols of "happenings in the soul"²⁸ and these are images of things. But then we hear of the difference between such thoughts as do not involve truth or falsity and thoughts which must be either true or false, and we learn that the same difference exists in speech. The reason is said to be that truth and falsity have to do with combination and separation, which is a rather vague statement. Next we learn that separate words by themselves have the character of being neither true nor false; and the presumption is, that combinations of words may have the character of being necessarily either true or false and, furthermore, that there is a similar structural difference between the two groups of thoughts. We know from passages in *On the Soul* and in the *Metaphysics* that Aristotle, in fact, has this in mind, but in this chapter of the *De interpretatione* he avoids saying it directly and distinctly. For his expression "thoughts without combination and separation" has an entirely different signification: obviously, it cannot mean thoughts that are neither combined nor separate, but means merely thoughts that are not concerned with either combination or separa-

²⁸ Or "sufferings of the soul" in Aristotle's Greek, "mental experiences" in the Oxford translation. In Latin the words *conceptio* and *conceptus* were used in this connection, cp. above, pp. 29 f.

tion (namely, of things). As for the things themselves, we may take it for granted that Aristotle did not intend to suggest that single things were neither true nor false and that combinations of things were necessarily either true or false, because that would be nonsense. But he does mean just this, that words taken separately, like "man" by itself or "white" by itself, do not express truth or falsity, whereas combinations of words may be such as to do so necessarily. Perhaps I may add without going into further details that in other writings, where he is more explicit in his statements, Aristotle openly declares that truth and falsehood do not occur in the things themselves. But wherever he speaks of this subject he is difficult to understand, and even his language loses its usual lucidity. To formulate this second problem of the introductory chapter of the *De interpretatione* briefly: if we take seriously the analogy between the two groups of spoken words and the two groups of their corresponding thoughts, then the relation of thoughts to things becomes much more complicated than we are prepared for; and if we let thoughts be nothing but likenesses of things, as is intimated at the beginning of the chapter, there would be no analogy between thoughts on the one hand and the difference of words and their combinations into sentences on the other hand.

We have now two more problems in addition to that with which we began. Thus at least three things need an explanation: (1) the fact of a separate treatment of judgments (or propositions) by Aristotle, a treatment which is in closer relationship to grammatical observation than Aristotle's syllogistic ever was; (2) Aristotle in a way presupposes the subject matter of psychology, without, however, attempting to find a psychological foundation for the details of his logical inquiry; and (3) he does not even seem to have a consistent view of the psychological correlate of his logical subject.

If we had no documents on logical inquiry older than Aristotle, I believe there would be no prospect of solving these difficulties; generations upon generations of logicians of late antiquity and of the Middle Ages have tried in vain to understand these features of the *De interpretatione* and its relation to Aristotle's *Analytics*

from the systematic point of view. Yet with the help of one part of Plato's dialogue *Sophistes* we are able to explain the whole matter, and perhaps in doing so clear the way even for modern logical studies.

Plato's earlier dialogues are works of the highest literary art, and their different parts and the whole are mutually explanatory. The same cannot always be said of Plato's later writings, to which the *Sophistes* belongs. In order to interpret that part of the *Sophistes* which has become the foundation of the logic of the *De interpretatione* and all medieval and modern logic that is influenced by it, I must tell a story, which is fortunately known to us through other sources; namely, passages in other Platonic dialogues, a few Aristotelian allusions, and a few other passages from ancient literature.

Antisthenes was, like Plato, a disciple of Socrates, older than Plato and opposed to his views in almost everything. There must have existed between Antisthenes and Plato a strong antipathy; and by violent attacks, both personal and doctrinal, Antisthenes succeeded in provoking Plato to such a degree that Plato felt compelled to retaliate in kind, finally even returning Antisthenes' vulgarities. Theoretically Antisthenes not only objected to the contents of Plato's doctrines but also—and this is what we are concerned with—he resented Plato's way of propagating what he stood for through fictitious Socratic dialogues. Here at least Antisthenes' motives are understandable without any mental effort on our part. For even today some people get the impression that the dialectical art displayed by the Platonic Socrates was confusing and complicating things rather than leading along the simple way to useful knowledge. Now, the latter, leading young people on the simple way to useful knowledge, was just what, according to Antisthenes, the historical Socrates did. So whoever has received a different impression from a Platonic dialogue must heartily agree with Antisthenes' motives in attacking the Platonic type of dialectic. Does it not consist in asking people 'What *is* this or that?' in such a way that there is no reasonable answer, and in enforcing upon them unexpected conclusions by an unfair exploitation of their harmless belief in the

alternative "Yes" or "No"? Guided by such motives Antisthenes invented a logical theory, destined to make an end of Plato's dialectical pretensions. The basis for this theory is an interesting logical observation, namely, that knowledge cannot be expressed in single words, but only by a combination of words in sentences. With a single word you can only name a thing, but in order to say what is, or what was, you have to form a sentence. Now, a sentence is by its very nature a combination of words. In a combination of words you can obviously express your knowledge of a combination of things, but it is equally obvious that it is nonsense to try to say one thing in a combination of words; and the assumption that it is possible to go even farther and to say one and the same thing in different ways, one of them true and another false, is even more nonsensical. A single thing can only be named, no statement as to what it is or what it is not can be made, because stating consists in using a combination of words and a combination of words simply does not fit a single noncombined object.

It sounds very simple. And at least this much is clear: we have only to swallow this, to feel immune against all that Platonic fuss about definitions and the art of questioning and answering in general as the only way to knowledge. Where Plato pretends to be seeking and finding, there is no knowledge at all and no way to knowledge, nothing but self-deception, if not worse. Such must have been Antisthenes' attack upon Plato's dialectic. We do not know enough of the details to be very exact, and for this reason it would also be difficult for us to criticize Antisthenes. But that is not necessary because so far as traditional logic is concerned Plato himself has done that part of the business. If Plato's dialectic made things look more complicated than they are—as many have believed—Antisthenes certainly went too far in simplifying them, and in doing so he misrepresented plain, obvious, logical facts. Plato had to meet him on the same level; and so it is certainly Antisthenes' achievement, if nothing else, to have forced Plato to write, once at least, a chapter of very plain logic. We must see what it looks like.

Interlocutors in these sections of Plato's dialogue *Sophistes*,

which I am going to quote, are a young Athenian, Theaetetus, whose part is that of an eager student, and a philosopher from abroad, who simply plays the part of the experienced teacher, kindly guiding the beginner.

"Let us inquire, then," says the teacher (*Soph.* 251a), "how we come to predicate many names of the same thing.—Give an example.—I mean that we speak of man, for example, under many names—that we attribute to him colors and forms and magnitudes and virtues and vices, in all of which instances and in ten thousand others we not only speak of him as man, but also as good, and having numberless other attributes, and in the same way anything else which we originally supposed to be one is described by us as many, and under many names."¹⁴—That is true.—And thus we provide a rich feast for tyros, whether young or old; for there is nothing easier than to argue that the one cannot be many, or the many one; and great is their delight in denying that a man is good; for man, they insist, is man, and good is good. I dare say that you have met with persons who take an interest in such matters—they are sometimes elderly men, whose meagre sense is¹⁵ thrown into amazement by these discoveries of theirs, which they believe to be the height of wisdom."

Plato goes first into an ontological inquiry and considers whether the assertion of absolute single, separate, and uncombined things can be upheld. The result is that "there is a communication of

¹⁴ One and the same sentence-subject may have many different sentence-predicates. Here we have not only the origin of the notion but also of the term "subject," as a more literal translation will show. "And in the same way with the other things: we lay down (or: put under) each one as one, and then we speak of it as many, and under many names." What is "laid down" or "put under" as one has become, in Aristotle's usage, the *hypokeimenon*, the underlying thing, in Latin translation *subiectum* (thrown under).

¹⁵ Literally: "who because of their poverty in intellectual wealth are . . ." The "poverty in intellectual wealth" is a hit at Antisthenes. Antisthenes despised wealth and praised poverty, but of course not intellectual poverty.—Incidentally, Antisthenes' insistence that man *is* (nothing but) man, and good *is* good, referred to attempts at defining "man" and "good." We know from elsewhere (Aristotle *Metaph.* 1043b, 26) that he interpreted a sentence with a thing as subject and a quality as predicate as a comparison, with a good sense for the etymology of the Greek pronoun *hoios*, which came to indicate quality from its use in comparisons.

classes" (259a). After that (260a ff.) Plato comes to a merely logical aspect of the problem; in Plato's formulation the question is now, "whether not-being mingles with opinion and language." In order to understand this formulation we must know that in the preceding ontological chapter "not-being" had been established as "mingling with other things," that is, as not being absolutely nothing, but as meaning merely difference (A is not B). But now, for the sake of transition, not-being is taken in the sense of falsehood, and what is questioned is whether a thing may be said in a sentence (or believed in an opinion) to be what it is not, that is, whether and how a sentence concerning a thing may be false. For us it is difficult to see the problem at all, not merely difficult to understand the solution. But the problem was stated by Antisthenes in such a way that Plato had to take it seriously. He found himself in a very exceptional logical situation, into which, perhaps, no logician after him could fall. Antisthenes' assertion that knowledge can not be expressed in single words, but only in sentences, and that, on the other hand, sentences are combinations of words is undeniably true. Then Antisthenes assumed that a combination of words can only be about a combination of things, not about one thing, and the disastrous consequences were that in regard to one thing there can be neither definition nor knowledge nor truth opposed to falsehood. How to face that? Since Aristotle logicians and grammarians are accustomed to assume that there are simple statements, and to define them as combinations of words in which something is said of something, the predicate of the subject, and which must be either true or false. But in Plato's case to do so would have been begging the question, because it was Antisthenes' thesis that such statements were impossible, because statements could not be made about one thing, but only about everything that is named in a sentence.

How could it be demonstrated that Antisthenes was wrong? Plato found an easy way: he let the teacher perform a little experiment. The only necessary assumption is that language has two different kinds of words, nouns and verbs, and this cannot be denied. Now the teacher proposes a combination of verbs (262b): "walks, runs,

sleeps . . .” Nothing happens ; it does not make speech and it does not make a sentence.¹⁶ Then a combination of nouns : “lion, stag, horse . . .” Again nothing happens, and he states (262c) : “neither in this way of stringing words together do you attain to *discourse* ; for there is no expression of action or inaction, or of the existence of existence or non-existence indicated by the sounds, until verbs are mingled with nouns ; then the words fit, and the smallest combination of them forms *language*, and is the simplest and least form of *discourse*.” Theaetetus does not yet understand ; the teacher has to explain : “When any one says ‘A man learns,’ should you not call this the simplest and least of *sentences*? — Yes. — Yes, for he now arrives at the point of giving an intimation about something which is, or is becoming, or has become, or will be. And he not only names, but he does something, by connecting verbs with nouns ; and therefore we say that he *discourses*, and to this connection of words we give the name of *discourse*.”

After that the teacher begins to analyze what they have got by experiment ; and they find, by experimenting again, subject and predicate, and the possibility of a false predicate. The new experiment also is simple ; the teacher forms a sentence about a very well-known subject, namely, his interlocutor (262e) : “I will *repeat* a *sentence* in which a thing and an action are combined, by the help of a noun and a verb ; and you shall tell me of whom the *sentence* speaks. — I will, to the best of my power. — ‘Theaetetus sits’ — not a very long *sentence*.¹⁷ — Not very. — Of whom does the *sentence* speak . . . ?”

¹⁶ In Greek “speech” (or “discourse,” “language”) and “sentence” are one and the same word: *logos*. This makes the passages quoted below from Jowett’s version almost untranslatable. In English a change of expressions is necessary, but then the logical result is obscured. For our purposes I introduced *italics*, wherever the Greek text has *logos*, or the corresponding verb *legein* “to speak.”

¹⁷ The “long sentence,” or rather “long speech,” is a retort to a pun made by Antisthenes. “Long speech” is in Greek proverbial for “too many (empty) words.” We happen to know that Antisthenes wittily called a definition “long speech” (Aristotle *Metaph.* 1043b, 26), because it tries to describe by means of a complex of words (*logos*) what according to him could have only one word, a name, of its own. A definition is speech (*logos*, more than one word) and therefore *eo ipso* “long speech” (too many words). Now Plato bases his defense on an analysis of a sentence of the shortest possible kind—not a very “long speech.”

Thus we learn what a subject is,¹⁸ and the teacher may form another sentence with the same subject. "Theaetetus, with whom I am now speaking, is flying." And he may ask what now can be said of the two sentences in opposition to each other, and he gets the reply: "The one is false, and the other is true," and then he can go a little further into that.

All these important things are easily demonstrable by experiment; but you need a second person who responds to your performance, because it is the mental experience of the other person, not merely description that furnishes the necessary verification of the logical facts.

As to the mental experience of the solitary thinker there is of course no such verification as in the case of the hearer of a sentence, all you can do is simply to assert that it must be the same experience. But then you assume that thinking may be understood as talking to yourself, otherwise the analogy cannot be clearly drawn.

It is exactly in this way that Plato comes from speech to opinion or judgment (263e): "Are not thought and *speech* the same, with this exception, that what is called thought is the unuttered conversation of the soul with herself?—Quite true.—But the stream of thought which flows through the lips and is audible is called *speech*?—True.—And we know that there exists in *speech* . . .—What exists?—Affirmation.—Yes.—When the affirmation or denial takes place in silence and in the mind only, have you any other name by which to call it but opinion?—There can be no other name."

The result is that what we have stated about the truth and falsehood of spoken sentences may be equally said of opinions and the like, or of judgments, if we prefer that expression. In a few words—not so clear as the preceding—Plato mentions that judgments may also originate from sense-perception, not merely from the speech of

¹⁸ I skipped on purpose that part of Jowett's translation in which he intrudes the technical term into the words of the dialogue. Plato could of course not presuppose the term "subject," while he was forming the notion; instead of "Who is the subject?" he has "Whose is the sentence?" and instead of "I am the subject," he has "mine."

the soul to itself (264a/b). But he does not explain that; and it would have been just as difficult for him as it was for Aristotle to explain the relation of judgments to sense-perception after he had treated judgments as exactly corresponding to the sentences of conversational speech. Here there is a gap in Plato's logical theory of the judgment, and Aristotle failed to close it: this is the explanation of the last and most difficult problem that arose when we considered the doctrine of the *De interpretatione* (see above pp. 50 f.).

But the other difficulties in Aristotle's logic of the judgment (above pp. 48 ff.) disappear completely when we consult Plato's *Sophistes*. If we ask (1) why Aristotle had a separate logic of judgment besides his syllogistic, which obviously could do without it, the answer is: because Plato had already established one, which was interesting enough and not to be overlooked. And if we ask why this logic considers grammatical facts, but only to a very limited extent, the answer is: because Plato's experiment needed just these grammatical facts, no more and no less, and because neither Aristotle nor traditional logic ever had the idea of replacing Plato's little experiment by another foundation.

If finally we want to know (2) about the relation of this logic of the judgment expressed in a sentence to psychology, the case can now be stated clearly. According to Plato's treatment it is evident that the relevant facts can only be verified by means of spoken words and sentences and that the results of such observations are simply presumed to have their exact equivalent in thinking. At the same time it seems only natural to let thinking precede speaking in reality. So we consider sentences and let the ultimate results be facts belonging to the psychology of thinking. But under these circumstances there is one thing we should not do, we should not pretend to explain the peculiarities of words and sentences by those of the corresponding units of thought. Plato, of course, does not do that in the purely logical chapter of the *Sophistes*, but unfortunately Aristotle was less cautious. I quote again from the introductory passage of the *De interpretatione*: "As there are in the mind thoughts which do not involve truth or falsity, and also those which

must be either true or false, so it is in speech. For truth and falsity imply combination and separation. Nouns and verbs, provided nothing is added, are like thoughts without combination or separation; 'man' and 'white,' as isolated terms, are not yet either true or false."

He talks as if we have—from psychology—a clearer conception of the thinking that is supposed to underlie and to precede words and sentences than of the difference of spoken single words and spoken sentences by themselves. Through this slight aberration he deprives his little treatise, and with it the second part of traditional logic, of its legitimate and practical basis, facts of speech, and creates the theoretical illusion of a merely psychological basis.

CHAPTER IV

SYLLOGISMS

WE COME BACK to syllogisms, with which I started in Chapter I. The reason for beginning with them was that Aristotle's *Topics*, according to his express testimony the first systematic treatment in its field, was conceived and worked out as a method of syllogistical exercise. Meanwhile we have looked for Greek foundations of the first and second parts of traditional logic, which contain, respectively, the logic of the concept and the logic of judgments. In both these cases the foundations were mainly laid by Plato, and an understanding of their original meaning depends on unprejudiced interpretation of Plato's rather than of Aristotle's writings. But there is a difference in Plato's contributions to the traditional doctrine of concepts and of judgments. As we stated, when Plato deals with concepts he is in fact dealing with definitions, and definitions may be asked for in discussions and conversations, but they are by no means always present wherever people talk and think. In controversial matters the attempt to arrive at a definition requires preliminary logical training; and it is Plato's manifold ways of giving such training or of speaking of it, according to the multifarious situations in his dialogues, that are at the basis of the traditional doctrines of definition and classification. But it must not be forgotten that a definition, and of course a concept understood as an exact correlate of a definition, becomes a reality of thought only after it has been looked for and found, whereas concepts taken vaguely as the mental equivalents of syllogistic "terms" are supposed to be immediate elements of thinking and to precede speech. Plato's "logic of the concept" is logical training for a task which up to his time did not occur at all in everyday life; for the fact that even everyday life can profit by such training for its own non-

philosophic purposes was first revealed and demonstrated as part of the ironical wisdom of Plato's own dialogue *Phaedrus*.

Plato's "logic of the judgment," on the other hand, takes into consideration only the elementary facts of the most primitive form of sentence, the simple statement in two words. These facts had been misrepresented before him (and against him), and the results of his theoretical reaction are the notions of subject and predicate and a demonstration of their relationship in a sentence that claims to be true, but may be either false or true. No system of grammar, logic, or psychology has since been able to do without them or, so far as I know, to replace Plato's experimental demonstration of their function.

The *Port-Royal Logic* of 1662, one of the main sources of the more modern types of traditional logic, declares in a candid statement of its own contents that logic, or the art of thinking, consists in the reflections which "men have made" on the principal operations of the mind. But clearly it makes a great difference whether originally men have made these reflections, of which traditional logic is now admitted to consist, with the aim of training the mind for new philosophic or scientific tasks or with the intention of stating ordinary logical facts correctly. Of course the one may be put into relation with the other, and probably must be so placed in a comprehensive system of logic, but certainly it should be done without confusion of the two different points of view. When we come to the Greek foundations of the third part of traditional logic, I should like to begin with this distinction, the importance of which appears to me to be made abundantly clear by our previous discussion.

If, then, we ask to which of the two types of logical inquiry Aristotle's *Topics* belongs, we find that raising the question is answering it, because according to Aristotle's own announcement at the beginning and his summing up at the end of the whole work the aim of this first systematic logical treatise was to find a method for the new educational invention of syllogistical training. In this connection the famous definition of the syllogism is by no means a reference to

a certain logical or psychological matter-of-fact object, but the formulation of a certain task occurring in dialectical practice. We shall not go again into the historical problem of the origin of this kind of logic; let us take it for granted that it may be fully explained from the turn in the history of philosophy which was caused by Socrates' way of philosophizing. We may skip, then, the consideration of those Platonic passages which serve as documents for the existence of that special kind of logical exercise within Plato's school which Aristotle's *Topics* presupposes. Nor have I time to go further into the details of the contents of the *Topics* for their own sake; I shall mention them only in so far as they may further the explanation of the incomparably more important logic of the *Analytics*.

But I have to make one exception. The last part of the *Topics*, as this work is preserved in our manuscripts, is devoted to a special subject and was according to all probability first conceived as an independent inquiry, but later on appended to the main body of the *Topics* by Aristotle himself. The chronological relation between these two unequal parts of the complete work is a rather complicated problem, but its solution is not of great importance for us; what is important, however, is practically certain, namely, that this last part of the *Topics*, known under the special title "Sophistic elenchi" (confutations), was also written before Aristotle had discovered the syllogistical doctrine of the *Analytics*. Compared with other parts of Aristotle's *Organon*, especially with other parts of the *Topics*, the little work on sophistic fallacies enjoys a rather good reputation in the logical literature of modern times. The criticisms made of it are generally fairly mild, a certain practical value is liberally conceded to it, and for textbooks of logic it still remains customary to have at least one chapter on fallacies. Though even in this case we cannot spend our time on the details and subtleties of Aristotle's treatment, we must repeat the question which we asked first with respect to the main body of the *Topics*: where did Aristotle pick up the subject matter of his "Sophistic elenchi"? Occasionally, indeed, he mentions the value of this part of his syllogistic for serious philosophic thinking, but the immediate subject of his

inquiry is, again, a highly artificial and, as we should say, unnatural one, namely, deliberately, even professionally, coined false reasoning. In spite of Aristotle's treatment the whole affair would be incomprehensible or at least unbelievable to us, if we did not have a dialogue of Plato, the *Euthydemus*, written about the time of Aristotle's birth, which contains such a lively picture of this kind of thing that we have to believe in the historical reality of its absurdities. In order to convince himself of the facts one has to read the whole dialogue; I can only give a glimpse of what was sold for a short time as genuine education in the art of thinking and arguing. Certainly Plato has exaggerated the facts, but only to a limited extent; because his dialogue was written in order to kill this sort of education by exposing its emptiness and complete ridiculousness, and so he had to keep within the limits of some likeness to the facts.

Now for that glimpse of the sophistical way to an appearance of wisdom and of Plato's fight against it as displayed in the dialogue *Euthydemus* (298d) ! In this part of the dialogue the sophists—two brothers, Euthydemus and Dionysodorus—have the misfortune to talk to a none-too-impressed interlocutor, a very self-confident and clever young man, Ctesippus. "If you will answer my questions, said Dionysodorus, . . . You say that you have a dog.—Yes, a villain of a one, said Ctesippus.—And has he puppies?—Yes, and they are very like himself.—And the dog is the father of them?—Yes, he said, I certainly saw him and the mother of the puppies come together.—And is he not yours?—To be sure he is.—Then he is a father, and he is yours; ergo, he is your father, and the puppies are your brothers.—Let me ask you one little question more, said Dionysodorus, quickly interposing, in order that Ctesippus might not get in his word: You beat this dog?—Ctesippus said, laughing, Indeed I do; and I only wish that I could beat you instead of him.—Then you beat your father, he said.—I should have far more reason to beat yours, said Ctesippus; what could he have been thinking of when he begat such wise sons?"

As I said, the dialogue was written about the time of Aristotle's birth; and if ever ridicule was handled as a deadly weapon, Plato

handled it so in this dialogue. Yet more than a generation later we find Aristotle pondering over the same old stuff. For most of his fallacies are either taken directly from Plato's *Euthydemus* or they are of the same silly kind.—"Is it possible to see with an eye you do not have?—No.—Is it true that you do not have one eye?—Yes.—Then, you cannot see with one eye."✓

Now, it is out of the question that in Aristotle's time an educator whose wisdom consisted of such old tricks would have found students, and so Aristotle's purpose cannot have been to fight such educators. It becomes clear from Aristotle's treatment and from his polemical references to others that in the meantime the study of fallacies and their solutions, the latter of which Plato's dialogue had only hinted at, had become part of the syllogistical game that as mental gymnastics was eagerly played both in Plato's and Aristotle's schools. Why not? As a competition with serious education the old sophistries had lost all danger, but they were certainly interesting subjects for dialectical exercises. So the origin of this part of traditional logic is easy to understand; but, curiously enough, it was just this most unnatural product of thinking, deliberate fallacies, that turned the attention of the rising science of logic from the more-or-less artificial and newly found objects and rules of argumentation to certain less conspicuous facts of the validity of thought. A syllogism like the following: this dog is yours, and he is an animal, then he is your animal, would scarcely ever have raised any interest for its own sake, but as a valid model of the kind after which the sophism of the dog who must be the father of his owner had to be faked in order to get a likeness of validity, it has a chance to obtain serious consideration. We may say that in opposition to the logic of the main body of the *Topics* the logic of fallacies in Aristotle's "Sophistic elenchi" is of that second type which has to point out and uphold ordinary logical facts against misuse. And in this connection the definition of the correct syllogism turns out to include a lot of arguments which would be contemptible in themselves but for the fact that their specious counterfeits have to be unmasked.

No doubt both the syllogistic of the main body of the *Topics* and that of the "Sophistic elenchi," each in its own way, mark a step in the history of logic; and both these different types of the logic of the syllogism are comparatively easy to explain with the help of Plato's dialogues. And yet these Aristotelian writings make very unsatisfactory reading, at least if one comes to them with such expectations as traditional logic cannot fail to arouse. For in spite of all the pains Aristotle has obviously taken, and in spite of his admirable handling of a vast number of details in order to master his materials, one thing soon becomes only too clear to us, if we try to read patiently the *Topics* and the "Sophistic elenchi," namely, the lack of a principle. I do not intend to say that it is in the nature of things that logic, especially syllogistic, has to be derived from one single dominant principle; what I want to assert is only that we expect such a principle if we come from traditional logic to Aristotle. The historical fact that we have to consider now is Aristotle's discovery or—depending on what we think of logic—his invention of such a principle. He did not have one when he wrote the *Topics* and the "Sophistic elenchi." But it is almost pathetic to see how much he desired to have one. At the beginning of the *Topics* Aristotle announces that the purpose of the course is "to find a method by which we shall be able to argue (*συλλογίζεσθαι*) about any proposed problem from probable premises, and shall ourselves under examination avoid self-contradiction."¹ But a little later he divides the possible problems and premises into four different classes, into which he is going to distribute his materials. He has to confess that this division is exposed to objection and is arbitrary to a certain extent. "But," he continues (102b, 35), "we must not on this account expect to find one single line of inquiry which will apply universally to them all: for this is not an easy thing to find, and, even were one found, it would be very obscure indeed, and of little service for the treatise before us. Rather, a special plan of inquiry must be laid down for each of these classes we have distinguished, and then, starting from the rules that are appropriate in each case,

¹ This is Professor Ross's translation, *Aristotle*, p. 56.

it will probably be easier to make our way right through the task before us. So then, . . . we must outline [in a rather inexact way] a division of our subject, and other questions we must relegate each to the particular branch to which it most naturally belongs."

Does not this peculiar attitude which is at the same time uncertain and apologetic betray with unconscious eloquence that Aristotle himself was not at all satisfied with this splitting of the promised method into four more-or-less problematic single methods? /

Now let us compare the first Book of the *Prior Analytics*. It is one of the most impressive passages in Aristotle's writings, unsurpassed in its proud objectivity, when after careful preparation he introduces his syllogistical principle, which has predetermined the history of logic for more than two thousand years (25b, 26): "After these distinctions we now state by what means, when, and how every syllogism is produced; subsequently we must speak of demonstration. Syllogism should be discussed before demonstration, because syllogism is the more general: the demonstration is a sort of syllogism, but not every syllogism is a demonstration.—Whenever three terms are so related to one another that the last is contained in the middle as in a whole, and the middle is either contained in, or excluded from, the first as in or from a whole, the extremes must be related by a perfect syllogism. I call that the middle term which is itself contained in another and contains another in itself: in position also this comes in the middle. By extremes I mean both that term which is itself contained in another and that in which another is contained. If A is predicated of all B, and B of all C, A must be predicated of all C . . . Similarly also, if A is predicated of no B, and B of all C, it is necessary that no C will be A."

This is the beginning of Aristotle's exposition of the three syllogistical "figures," but as is well known it is not only the alpha but also the omega of this exposition inasmuch as according to Aristotle every syllogism is reducible to one of the two forms stated at the beginning. After Aristotle has finished the exposition and has added, on the basis of the new syllogistic, rules for the discovery of argu-

ments, the pride he takes in the achievement expresses itself a little more explicitly (45b, 36) :

"It is clear from what has been said not only that all syllogisms can be formed in this way, but also that they cannot be formed in any other. For every syllogism has been proved to be formed through one of the aforementioned figures . . . The method is the same in all cases, in philosophy, in any art or study. We must look for the attributes and the subjects of both our terms, and we must supply ourselves with as many of these as possible, and consider them by means of the three terms, refuting statements in one way, confirming them in another, in the pursuit of truth starting from premises in which the arrangement of the terms is in accordance with truth,² while if we look for dialectical syllogisms we must start from probable premises."

I think it is evident that the author was now convinced that he had at last found that one single method which he had wished for but not hoped for when he had first tried, in his *Topics*, to systematize the syllogistic art. It is evident, too, that he had not yet found the new method when he wrote the "Sophistic elenchi," otherwise he would not have left to later logicians the task of bringing his thirteen different kinds of fallacy into some relation to the one principle. Obviously Aristotle must have made an entirely new start after he had written the *Topics* and the "Sophistic elenchi." And so it seems that we have to locate for the third time the subject matter of an Aristotelian treatise on syllogisms. Where did Aristotle find that pattern of a syllogism which has since dominated the thoughts of philosophers whenever they have followed or attacked Aristotle's logic? But if with regard to the dialectical and the sophistical syllogisms our questions were easy to answer, unexpectedly easy I might say, there appears to be no such answer in this case. Of course there may be found a few instances of the perfect syllogism in Plato's dialogues, but there are certainly few in comparison with other types. In general so much transformation has to be done, if

² Rather: "which we have listed as true," cf. 43b, 1-11; see the Greek text in both passages.

one is determined to find the Aristotelian perfect syllogism in pre-Aristotelian philosophic literature and in what is known of the mathematics of the time, that it becomes improbable that the notion of this syllogism was simply taken from experience.

How, then, did Aristotle discover it? The solution of this most important problem of the early history of logic seems to be that the syllogism of Aristotle's developed logic was found as a product of abstract construction rather than as an object of empirical observation. One reason why it is so difficult to locate the perfect syllogism is certainly the abstract way in which it is proposed and dealt with by its inventor. In Aristotle's systematic exposition of possible syllogisms, in the first Book of the *Prior Analytics*, only the nonconclusive combinations of propositions are supposed to need exemplification through concrete terms like "animal, man, horse" or "animal, man, stone" (26a, 9), whereas the conclusive forms are merely represented by means of letters symbolizing the necessary three terms. Aristotle does not even once hint at concrete models from which his abstract patterns of correct syllogisms had been derived; otherwise, indeed, there would not be a problem and the history of Greek logic would be easy to write.

The *Topics* deals with a multitude of multiform syllogisms, some, of course, more interesting than others, but all of them serving a definite purpose, correct syllogistical refutation or corroboration of one side of a given problem. The "Sophistic elenchi," on the other hand, deals with more-or-less interesting fallacies, that is, invalid syllogisms, and exposes their incorrectness, which can only be done by reference to the conception of the correct syllogism. But this conception will be influenced by the correct patterns, of which the single sophisms are faked counterfeits. Thus, as we have already seen, the study of fallacies compels the logician to take into consideration even such correct syllogisms as would have no practical interest for their own sake. Now, after an investigation like the "Sophistic elenchi" has been put side by side with the treatment of the *Topics*, the one definition of the syllogism of which both treatises, each in its own way, make use, is necessarily reduced to

a rather vague denotation of the correct syllogism in general, interesting for its own sake or not, as the case may be, provided only it is correct. How can this vague general notion of the correct syllogism be made clear?

So much is certain: Aristotle did have the definition of the syllogism, before he found the perfect syllogism. On the other hand, the perfect syllogism fits in so well with the definition that if the definition cannot have been found after the perfect syllogism the perfect syllogism must have been found with the help of the definition.

Taken by itself the definition of the syllogism is fairly indeterminate with regard to its constituents: "A syllogism is an argument in which, certain things having been assumed, something other than these follows of necessity by virtue of the things assumed." What are these "certain things" and this "something else"? The premises and the conclusion, of course. But what are these? The "*Sophistic elenchi*" uses "the definition of the premise" (or "proposition," 169a, 7) only occasionally and for a special purpose, and the *Topics* has, instead of a general definition, the division into four different classes, according to differences of content. The *Prior Analytics*, however, deliberately starts its whole doctrine with a definition of what the premises are and, by implication, of what the conclusion is (24a, 16): "A premise is a sentence affirming or denying one thing of another." No more is said, and no less could be. It is just that general idea of a statement with subject and predicate which had to be acknowledged as possible after Plato's *Sophistes*. But the addition of this definition to the definition of the syllogism makes all the difference to the theoretically and practically unsatisfactory task that Aristotle had undertaken in his *Topics*. For now the definition of the syllogism must be understood as follows: A syllogism is an argument in which, sentences affirming or denying one thing of another having been assumed, another sentence affirming or denying one thing of another follows of necessity by virtue of the sentences assumed. This is not any longer a description of what is actually practiced in dialectical games, or even in serious thinking,

or of what is actually counterfeited in pseudo-syllogisms; it is rather like a mathematical problem and strictly enough determined so that—notwithstanding some subsidiary determination from empirical practice—a predominantly theoretical solution is secured. From some decisive moment Aristotle must have seen the possibility of such a theoretical solution of the problem of syllogistic. There seems to be no other way of explaining the abstract, a priori, and merely quantitative character of Aristotle's system of possible valid syllogisms and of its peculiar relation to the actual syllogistic practice of his time and of his school, a relation which is curiously half-way between independence and dependence. For not everything that is characteristic of Aristotle's developed logic can be derived from the abstract meaning in which the definition of the syllogism could be taken after the abstract definition of the propositions had been assumed. Too many things remained still too undetermined. But I think it is only natural that in working out the details of his theoretically planned system of syllogisms Aristotle let himself be guided—consciously or unconsciously—by the actual features of the only syllogistical practices that had been studied before, mainly by himself.

It is, perhaps, possible to follow Aristotle in some of the single steps he had to take before he could outline and elaborate his *Analytics*, but it is a difficult task,⁸ and we must content ourselves with having reached a point of view from which the system as a whole becomes understandable. I think a large part of traditional logic, too, is understandable in a general way from this point of view, from which the definition of the syllogism suddenly appears like a mathematical problem, solvable, at least partly, independently of experience.

But there is still one source of confusion which has hindered the general understanding of Aristotle's logic from later antiquity up to our time and which now, I hope, we shall be able to clear away

⁸ Cf. Pauly-Wissowa, *Real-Encyclopädie*, s.v. "Syllogistik," Vol. IV A, cols. 1059 ff.; Friedrich Solmsen, "The Discovery of the Syllogism," *Philosophical Review*, L (1941), 420.

with comparatively little effort. As I said, in spite of the definition of the syllogism and of its propositions, there are still too many things left undetermined for the theoretical logician to be able to proceed without help from outside experience. In the first place, not even the starting point is fixed. The problem set by the definition of the syllogism may be understood in two entirely different ways. Either we must start with given combinations of premises and look for the possible inferences, or we must start with a given conclusion and look for the possible premises. The first seems the natural thing to do, and so it has been overlooked again and again that Aristotle understood his task in the second sense. His syllogistic is essentially a system of possible combinations of premises leading to given conclusions, *not* a study of the possible inferences from given propositions. Consequently in Aristotle's logic even a demonstration, that is, a scientific syllogism producing genuine knowledge (71b, 18), is not supposed to lead from known premises to a conclusion up to the moment unknown; on the contrary, according to Aristotle the genuine scientific syllogism may have as its conclusion a previously known fact, and the scientific explanation that had to be found for the known fact will form the premises. In many cases it is only human dependency on sense-perception that forces us to let the known facts be premises in order to find unknown things as a conclusion, but as far as nature is concerned this may be a preposterous way of reasoning. For instance, in the case of planets which are comparatively near and which do not twinkle, as human beings we may reason in the following way:

C = planets; B = not twinkling; A = proximity:

What does not twinkle	is near	B — A
Planets	do not twinkle	C — B
Planets	are near	C — A

But what we get in this way is merely a fact, not an explanation. For planets are not near *because* they do not twinkle. If, on the other hand, we reason this way:

C = planets; B = proximity; A = not twinkling:

What is near	does not twinkle	B — A
Planets	are near	C — B
<hr/>		<hr/>
Planets	do not twinkle	C — A

we have the genuine scientific syllogism, a fact and its explanation, for it is *because* planets are near that they do not twinkle.⁴

I see no reason for us to discuss which way of reasoning is preferable and the more scientific; certainly we are entirely free to decide against Aristotle or to deny any difference in value. On the other hand, if we want to understand Aristotle's logic, we must let him, too, have his way, otherwise there will be difficulties. Taken abstractly, the definition of the syllogism may be understood—and it has been understood many times—to promise that something new will come out of given premises, and then, indeed, the objection is unavoidable that the Aristotelian syllogism cannot produce anything new without some kind of *petitio principii*, begging of the question. The attempts to defend Aristotle against this objection are not always very fortunate and not always very instructive.⁵ But, without going into the details of these endless discussions we may state that there must be some misunderstanding of Aristotle on both sides; for, as we have seen, the most valuable kind of the Aristotelian syllogism according to Aristotle himself, the scientific *demonstration*, does not pretend to have something new in its conclusion, but to contain a scientific explanation in its premises. To object, in this case, that the conclusion does not reveal some unknown fact makes no sense, nor is it advisable to defend such a syllogism against such an attack. So there are misunderstandings, and the simple explanation is that Aristotle himself did not understand his definition of the syllogism to mean that the syllogism provided something new in its conclusion. Why not?

I have to repeat that not everything characteristic of Aristotle's

⁴ *Anal. post.* I. chs. ii, xiii; cf. *Anal. pr.* 46a, 17–27.

⁵ Cf. my article "Syllogistik" in Pauly-Wissowa, *Real-Encyclopädie*, Vol. IV A, cols. 1053–1055.

developed logic can be derived from the new abstract meaning of the definition of the syllogism. It is only natural that Aristotle let himself be guided partly by the actual features of the only syllogistical practices that had been studied before. Now, the main feature of these practices was the preëxistence of the conclusion and the fact that the *premises* had to be looked for in order to get a syllogism. Taken abstractly, the definition of the syllogism may be understood both ways, either the premises or the conclusion may be given, and the other part of the syllogism looked for. But taken as Aristotle's definition of the syllogism it was so far faithful to his original idea that it still meant a more-or-less artificial act of argument from the premises toward the conclusion, an argument actually preceded by a mental process in the opposite direction, from a given conclusion to suitable premises.

As I tried to show in my first chapter, this two-sided conception of the syllogism was conditioned by the philosophic situation in Athens, where Aristotle, as a very young man, became a student in Plato's Academy. At that time and in that milieu philosophy seemed to live its real life in conversation between people rather than in the thoughts of the solitary thinker. This period soon came to an end. After that Aristotle's logic must have seemed, as it seems today, partly comprehensible, but partly perverse. Thus it is not by chance that during the two or three centuries after Aristotle's death his logic became superseded by another logical system. Cicero, the most cultured Roman of his time, a man who really knew much of Greek philosophy, is thinking of Stoic logic, a product mainly of the third and second century B.C., whenever he mentions such elements of logic as may be supposed to belong to the conventional higher education. In his time the revival of Aristotelian logic, together with the revival of Aristotle's philosophy in general, was only beginning; but even in later antiquity an unprejudiced interpretation of some of the Aristotelian fundamentals seems to have been impossible. Carl Prantl was certainly not entirely wrong when he held the Stoic logicians responsible for some features of traditional logic which disagree with the Aristotelian foundation. In my opinion the most

important and interesting change was a simplification of the queerly double-faced aspect of the Aristotelian syllogism and its adaptation to the rather naïve concept that the function of mental activity is to enlarge the amount of known facts by simply proceeding from them to something so far unknown. The results were definitions of the scientific syllogism like this one which we find in Cicero: a demonstration is an argument which leads from things perceived to another thing which was not yet perceived.⁶ Even ancient commentators on Aristotle agree that a conclusion should certainly reveal something unknown so far. In competition with Aristotle the Stoic school developed a new system of syllogistical forms which probably culminated in a form intended to reproduce the way in which scientific discoveries are made. We know the following example: "If drops of sweat transpire through the skin, there must be invisible pores; now, drops of sweat do transpire through the skin; therefore there are invisible pores."⁷ No matter whether or no this is a description of how the scientist comes to new knowledge, the intention of following his mental ways directly by means of a simplified straight-forward syllogistic is clear, and the intention may be quite remarkable. Perhaps Aristotle's logic was unnecessarily complicated or perhaps it was too dependent on the temporary circumstances of his time; but we shall certainly not get rid of what we have to get rid of so long as we ourselves remain unconsciously dependent upon a misunderstood and misinterpreted Aristotelian logic. Thus we have to get acquainted with the historical fact that according to Aristotle's concept of a syllogism the syllogism itself and the preceding mental activity run in opposite directions.

⁶ Cicero *Academica* ii. 26.

⁷ Sextus Empiricus *Hyp. Pyrr.* ii. 140.

CHAPTER V

INDUCTION; ANCIENT AND MODERN LOGIC

THE LAST single item I shall discuss is induction. Induction is the Latin for the Greek noun *epagoge*; the corresponding Greek verb *epagein* means to lead or to bring a person to something. Plato uses the word in a clever illustration of the function of an example, which we find in one of his latest writings, the *Statesman*. "When children," he explains (277e), "are beginning to know their letters, . . . they distinguish the several letters well enough in very short and easy syllables, and are able to tell them correctly; whereas in other syllables they do not recognize them, and think and speak falsely of them. — Very true. — Will not the best and easiest way of *bringing* them to that which they do not as yet know be — Be what? — To refer them first of all to cases in which they judge correctly about the letters in question, and then to compare these with the cases in which they do not as yet know, and to show them that the letters are the same, and have the same character in both combinations, until all cases in which they are right have been placed side by side with all cases in which they are wrong. In this way they have examples, and are made to learn that each letter in every combination is always the same and not another, and is always called by the same name. — Certainly. — Are not examples formed in this manner? We take a thing and compare it with another distinct instance of the same thing, of which we have a right conception, and out of the comparison there arises one true notion, which includes both of them. — Exactly."

In this Platonic passage the verb *epagein*, to which our term "induction" goes back, is not yet used technically; as it stands in Plato's text, it simply means to lead a person to something not yet known by him. But when we come to Aristotle we see that in the meantime the Greek equivalent to "induction" had become a tech-

nical term which now designates the whole procedure which Plato tried to illustrate and recommended as the best and easiest way of making a person's incomplete knowledge universal. *Epagoge*, or "induction," now comes to mean leading a person on to a universal truth by confronting him with single instances in which he is already able to see it. In the first book of Aristotle's *Topics* induction is opposed to syllogism as a second kind of dialectical procedure, and we get the following description of it (105a, 13): "Induction is the way to the universal through the particulars,¹ as, for instance: if the skilled pilot is the most efficient, and likewise the skilled charioteer, in general the skilled man is the best at his particular task. Induction is the more persuasive and clear; nearer to sense-perception, and the many have it in common; syllogism, on the other hand, is more compelling and more effective against the professional debaters."² In another passage of the *Topics* Aristotle comes back to this difference (157a, 18): "Syllogism should be employed against dialecticians rather than against the crowd; induction, on the other hand, is most useful against the crowd"; and then he refers to his previous statement. The comparative artlessness of induction is also implied in the advice that one should do one's inductive reasoning with a young man as interlocutor and one's training in syllogistic reasoning with an expert (164a, 12). In fact, induction is dealt with throughout the *Topics* only as a subsidiary means of getting necessary premises, not as a direct way of attacking a primary problem. The important question of the theoretical validity of induction is nowhere raised; for the practice of the *Topics* a merely practical rule is sufficient, namely, that an interlocutor has to grant the universal, when an induction is made on the strength of many cases, if he is unable to bring some negative instance (157a, 34; 160b, 2).

Even in the developed logic of Aristotle's *Analytics* induction is

¹ The readings "the universal" (singular) and "through the particulars" are confirmed by Alexander, *In Topica*, our oldest source for the constitution of Aristotle's text.

² In this passage I changed expressions of the Oxford translation that did not seem quite adequate. I seize the opportunity of referring to Professor Ross's lucid treatment of the difficulties in Aristotle's theory of induction (*Aristotle*, pp. 38-41).

generally understood as something which takes place between two people, but here as the only means of teaching another person such propositions as cannot become properly known by means of syllogism because they cannot be deduced scientifically from other propositions. It is part of Aristotle's doctrine that there must be such immediate premises or indemonstrable truths (Anal. post. 72b, 18). Before teaching an indemonstrable truth, the teacher, of course, is in possession of the truth. If we ask how he manages to teach it—since we know he cannot demonstrate it properly by syllogism—the only answer we get is, “by induction,” that is, by pointing out particular cases. It is simply taken as a fact, not explained logically, that this is a way of making the pupil aware of indemonstrable truths. A connection is stated between induction and sense-perception—there can be no pointing out of particular facts without reference to perception (81a, 38); and at the end of the *Posterior Analytics* a comparison (not quite clear) is made between the way in which the soul comes from single sense-perceptions to universal concepts and the way in which we come by induction, the pointing out of particular cases, to the knowledge of the universal truths implied in them. In this connection Aristotle uses the phrase (100a, 13): “The soul is so constituted as to be capable of this process,” in other words it is a psychological fact. Finally, we learn that this fact must be attributed to the highest intellectual faculty of the soul, which is called *nous* and supposed to be a principle of immediate intuition. The solution, then, of this mystery of induction, as far as Aristotle provides a solution, is that there is an intuitive faculty in the soul which is capable of grasping indemonstrable universal truths from particulars, if the latter are pointed out to it.

In the most important passages where Aristotle mentions induction he is not thinking of a different kind of logical procedure, which, unfortunately, he calls by the same name and, even more unfortunately, does not even always keep theoretically distinct from the first kind which we have been considering. While in this first sense induction is a way of making another person see a universal

truth immediately with the eyes of his own soul, in the second sense induction, or *proof* by induction (or even *sylogism* by induction), is merely a way of verifying a universal assertion by going through the particulars concerned and showing that there is actually no exception.) In the *Topics* Aristotle handles verification by induction in a very primitive way, simply as a means of confirming a statement of his own (which, incidentally, he may believe to be also demonstrable by syllogism). For instance, in the case of his division of propositions into four different kinds according to the nature of their predicates (103b, 1), and in the case of his division of verbal fallacies into six different kinds (165b, 27), proof by induction means simply that you may consider any single proposition or any linguistic fallacy and will always find it actually belonging to one of the four or six stated species and that you will not find any exception. The only interesting thing here is the pretentious name for a more-than-simple logical procedure; I think it is fairly certain that the name was not invented for this type of induction, but borrowed from the other kind, which was certainly important enough to be designated by a technical term.

On the other hand, it is true that verification, or *proof* by induction, has gained considerably in significance when it is later treated by Aristotle. A careful interpretation of a much-discussed chapter of Aristotle's *Prior Analytics* (68b, 15) would show, in my opinion, that, as far as logical principles are concerned, Aristotle is here on the same ground with the methods of natural science which modern so-called inductive logic makes the object of its study. In fact, Aristotle's theory of what he then calls the "sylogism by induction" and his example of an inductive confirmation of the biological hypothesis which asserts a connection between long life and the lack of bile is so dependent on the actual scientific discussions of his time that we should not be quite able to understand the logical chapter if we did not have sufficient knowledge of those discussions from a chapter in one of Aristotle's writings on natural science (*De partibus anim.* 677a, 11-b, 10).

At any rate, the main difference between Aristotle's treatment of

this second kind of induction and its treatment in modern textbooks of logic consists in the different degree of importance which is attributed to it. Aristotle studies it only occasionally, as one of the secondary modes of argument and as understandable and deducible from his all-important syllogistic principle. This is indeed very far from the much-more-interested attitude of modern logicians toward this type of induction, no matter whether they contrast its study or combine it with the study of the syllogism. }

Traditional logic usually contrasts the logic of induction, or inductive logic, with the logic of the syllogism, or, as it is now called, "deductive" logic, and the importance that is now generally attributed to the study of induction was originally connected with that sharp distinction. In order not to complicate things more than absolutely necessary I shall omit recent criticisms of the antithesis, although the modern objections to a separate study of syllogisms and induction have a certain affinity to Aristotle's treatment of the second kind of induction. But at the basis of all modern discussions is certainly the distinction between the study of syllogisms and the study of induction. Obviously this now traditional distinction goes back in a way to Aristotle's logic. "Syllogism" is understood as the way from universal to particular and "induction" as the way from particular to universal ; at least the contrast of syllogism and induction as the two different complementary ways of teaching and learning and the description of induction are immediately taken from Aristotle. Yet in the modern idea there are two serious misunderstandings of Aristotle's conception. First, it is supposed to be the intention of Aristotle's system of possible syllogisms to teach the way from given premises to unknown conclusions, and if that is believed to be the doctrine of syllogisms, the *Port-Royal Logic* is certainly right in the following introductory remarks concerning the third part of logic : "That part of which we have now to treat, and which comprehends the rules of reasoning, is regarded as the most important in logic, and is almost the only one which has been treated with any care. But it may be doubted whether it is really as useful as it has been supposed to be. The greater part of the errors

of men . . . arises much more from their reasoning *on* false principles, than from their reasoning wrongly *from* their principles. It rarely happens that men allow themselves to be deceived by reasonings which are false only because the consequences are ill deduced ; and those who are not capable of discovering such errors by the light of reason alone, would not commonly understand rules which are given for this purpose, much less the application of them." Now, this is a complete misunderstanding of Aristotle's intentions, because, as we have seen, he always understood his syllogistic as a method of looking for the right premises, not of drawing new conclusions from given premises. So with reference to the genuine Aristotelian logic the objection is quite preposterous ; but it is a good example of the modern tendency to find fault with Aristotle because his syllogistic taken as a way *from* the principles is superfluous and to supersede this useless part of logic by working out some way *to* the principles. In this latter tendency others (though not the logicians of Port-Royal) let themselves be guided by Aristotle's position that induction is the only means of teaching principles. Here, again, Aristotle must prove disappointing as long as his two different notions of induction are not kept even more separate than Aristotle himself has kept them. I think it would be possible to describe the development of the modern logic of induction as a result of continued attempts to transform Aristotle's second type of induction into a way to principles. This second type is the only one which was presented in a purely logical treatment ; but with Aristotle this type of induction had not been a method of discovery of principles ; it was only a way of logical verification of an anticipated statement, and it seems that it has remained what it was from the beginning until now. It simply cannot replace entirely the other type of induction. But what, then, has become of this other kind, the genuine way to principles, that way from particular to universal which was the original antithesis and the original complement to the syllogism and, according to Aristotle, the only means of teaching undemonstrable truths ?

I am glad to be able to give a clear answer by consulting again

Cohen and Nagel's modern textbook of logic. Under the heading "What is inductive reasoning?" the authors quote³ the Oxford translation of a large part of Aristotle's description of the "process of discovering a general rule in a special case of it" from the *Posterior Analytics* (99b, 36 ff.) ; it is that chapter which I mentioned when I spoke of Aristotle's first kind of induction (above p. 77). We, too, need a general impression of the Aristotelian passage ; so I shall quote the same words, without being too meticulous about the difficulties of interpretation. "Though sense-perception is innate in all animals, in some the sense-impression comes to persist, in others it does not. So animals in which this persistence does not come to be have either no knowledge at all outside the act of perceiving, or no knowledge of objects of which no impression persists ; animals in which it does come into being have perception and can continue to retain the sense-impression in the soul : and when such persistence is frequently repeated a further distinction at once arises between those which out of the persistence of such sense-impressions develop a power of systematizing them and those which do not. So out of sense-perception comes to be what we call memory, and out of frequently repeated memories of the same thing develops experience ; for a number of memories constitute a single experience. From experience again—i.e., from the universal now stabilized in its entirety within the soul, the one beside the many which is a single identity within them all—originate the skill of the craftsman and the knowledge of the man of science

"We conclude that these states of knowledge are neither innate in a determinate form, nor developed from other higher states of knowledge, but from sense-perception. It is like a rout in battle stopped by first one man making a stand and then another, until the original formation has been restored Thus it is clear that we must get to know the primary premisses by induction ; for the method by which even sense-perception implants the universal is inductive."

This was Aristotle. Now let us see the modern comment : "This

³ *An Introduction to Logic and Scientific Method*, p. 274.

process is an important stage in getting knowledge. Induction, so understood, has been called by W. E. Johnson *intuitive induction*. Nevertheless, this process cannot be called an *inference* by any stretch of the term. It is not a *type of argument* analyzable into a premise and a conclusion. It is a perception of relations and not subject to any rules of validity, and represents the gropings and tentative guessings of a mind aiming at knowledge. Intuitive induction is therefore not antithetical to deduction, because it is not a type of inference at all *There can be no logic or method of intuitive induction.*"

✓I think it is very satisfactory to find modern logic emphasizing the difference between the kind of induction with which the above-quoted Aristotelian chapter deals and that which is commonly called "induction," which has its equivalent in Aristotle's other type of induction, and it is certainly true that this is not a type of argument analyzable into ordinary premises and a conclusion. So far careful interpretation of Aristotle's logical texts and modern logical analyses are in agreement. But then we get into difficulty. For according to Aristotle induction is only comparable, not identical, with the described mental process which begins with sense-perception and results in universals. There can be no doubt of that. The decisive sentence is (this time I quote another translation*) : "it is clear then that it is by induction we recognize the 'first things'; for it is thus that perception *too* produces the universal in us." There can also be no doubt that according to Aristotle this induction is antithetical to syllogism or deduction and that it does not represent the gropings and tentative guessings of a mind, but a certain definite way through the particulars to the universal. How are we to explain this obvious divergence between Aristotle's notion of induction and the modern concept of intuitive induction? ✓

The explanation is easy enough. Let me first repeat Aristotle's description of induction from the *Topics* : "Induction is the way to the universal through the particulars ; as, for instance : if the skilled

* The translation and the interpretation which seems inevitable to me are found in Ross, *Aristotle*, p. 55.

pilot is the most efficient, and likewise the skilled charioteer, in general the skilled man is the best in his particular task." What does this example represent? Let me add a fairly short quotation from Plato's dialogue *Meno* (88a): "*Socrates*: Next, let us consider the goods of the soul: they are temperance, justice, courage, quickness of apprehension, memory, magnanimity, and the like? *Meno*: Surely. *Socrates*: And such of these as are not knowledge, but of another sort, are sometimes profitable and sometimes hurtful; as, for example, courage wanting prudence, which is only a sort of confidence? When a man has no sense he is harmed by courage, but when he has sense he is profited? *Meno*: True. *Socrates*: And the same may be said of temperance and quickness of apprehension; whatever things are learned or done with sense are profitable, but when done without sense they are hurtful? *Meno*: Very true. *Socrates*: And in general, all that the soul attempts or endures, when under the guidance of wisdom, ends in happiness; but when she is under the guidance of folly, in the opposite? *Meno*: That appears to be true."

Obviously, Aristotle's notion of induction may be adequately represented by the part of a Socratic dialogue which I have quoted; even his example—if the skilled pilot is the most efficient, and likewise the skilled charioteer, in general the skilled man is the best at his particular task—is nothing but a condensed abstract of some piece of Socratic dialectic. Now we must recall that according to a famous passage of Aristotle's *Metaphysics* (1078b, 27) inductive conversation was one of the two things (the other was universal definition) of which the invention could justly be attributed to Socrates. Of course this does not mean that Socrates found some new process of mental groping and grasping, but that he had his own method of making things clear to people.

Like his notion of the syllogism, Aristotle's notion of induction is derived from dialectical practice. So it presupposes two persons, a questioner or teacher, and a respondent or disciple. We have to distinguish between the external performance, which is entirely dependent on the questioner's purpose and his dialectical skill, and

what is happening in the soul of the respondent, happening as a psychological fact but not as an act of solitary thinking. It would be nonsense to try to describe it immediately as an act of independent thinking; to compare it with the way in which we come from sense-perception to universals, as Aristotle did, is probably the farthest one can go toward a psychological explanation. But while the difficulty of describing what is actually going on in the mind of the respondent can scarcely be overrated, there is on the other hand not the slightest obstacle against describing the external performance and its logical result; and more than this is not required in order to explain how with Aristotle there could be (what modern logic denies) a logic and a definite method of intuitive induction.

We have now finished our reconsideration of the ancient foundations of traditional logic with respect to the four main topics of traditional logic: concepts, judgments, syllogisms, and induction. We began the investigation with the fact that modern logic has considerable difficulty in defining the nature of its traditional subject matter, and we found reason to ask, with special reference to Aristotle's syllogistic: How could Aristotle anticipate the subject matter of logic without noticing the difficulties? Where did he find the subject matter of his syllogistic? I think we may now repeat this question in a more general form and ask with reference to all four topics at once: Where did ancient logic find its subject matter, and how did it anticipate to some extent the subject matter of modern logic, without becoming involved in the difficulties that trouble modern logicians?

The answer, then, is this: it found its subject matter in the sphere of conversation, and it was exempt from the modern difficulties because it concentrated almost exclusively on such logical operations as are capable of external performance or external experimentation between two people. Concepts in Plato's and Aristotle's treatment are the exact correlates to the allegedly Socratic question: "What is this or that?" certainly a conversational issue; the function of judgments was just so far determined by Plato, as it is possible to verify the facts in a simple experiment between two people; and as to

sylogisms and induction, it will not be necessary to say again what I have been emphasizing just now. The foundations thus laid by ancient logic are fairly solid, for reasons easy to understand—one might say because of their palpability—only they are rather scanty and incoherent and scarcely fit or sufficient to support more than comparatively few separate parts of a modern logical system.

Yet in my opinion there is also a certain onesidedness in modern logic, or in some modern logic, compared with Plato's and Aristotle's point of view. Here I should like to quote from a modern classic. John Stuart Mill begins his *System of Logic* with an introductory chapter about the definition and the province of logic. He claims the right to use the word "reasoning" in its more extensive signification, in which not only syllogizing but also induction is included; and he extends the province of logic even beyond the meaning of the terms "reasoning" and "argumentation" so that all operations of the human understanding in the pursuit of truth fall within it: naming, classification, definition, and—in his own words—"all other operations over which logic has ever claimed jurisdiction They may all be regarded as contrivances for enabling a person to know the truths which are needful to him and to know them at the precise moment at which they are needful." But a most remarkable limitation is annexed: "Other purposes, indeed, are also served by these operations; for instance, that of imparting our knowledge to others. But, viewed with regard to this purpose, they have never been considered as within the province of the logician. The sole object of Logic is the guidance of one's own thoughts: the communication of these thoughts to others falls under the consideration of Rhetoric, in the large sense in which that art was conceived by the ancients; or of the still more extensive art of Education. Logic takes cognizance of our intellectual operations, only as they conduce to our own knowledge, and to our command over knowledge for our own uses. If there were but one rational being in the universe, that being might be a perfect logician; and the science and art of logic would be the same for that one person as for the whole human race."

Here we may stop; what we have read is surprising enough.

Rhetoric was never conceived in that large sense by the main ancient authorities on logic, Plato, Aristotle, or even the Stoic logicians—of course one cannot appeal from them to Cicero and Quintilian—nor can it be true in any possible sense that the logical operations, when they serve the purpose of imparting our knowledge to others, have never been considered as within the province of the logician.

On the contrary, it is a fact that even in Aristotle's developed logic of the scientific syllogism and of the complementary induction both these main "operations of the human understanding in the pursuit of truth" are almost exclusively considered as ways of teaching and learning. There could be no more impressive illustration of Aristotle's view than the beginning of the *Posterior Analytics*, and to offset Mill's flat denial I shall quote once more the Oxford translation: "All instruction given or received by way of argument proceeds from pre-existent knowledge. This becomes evident upon a survey of all the species of such instruction. The mathematical sciences and all other speculative disciplines are acquired in this way, and so are the two forms of dialectical reasoning, syllogistic and inductive; for each of these latter makes use of old knowledge to impart new,⁵ the syllogism assuming an audience that accepts its premisses, induction exhibiting the universal as implicit in the clearly known particular. Again, the persuasion exerted by rhetorical arguments is in principle the same, since they use either example, a kind of induction, or enthymeme, a form of syllogism."

Here it is all teaching and learning, if not actual questioning and answering, and there are very few reflections on solitary thinking in the whole of Aristotle's logical writings. Now, of course, an author of Mill's rank is entitled to claim the right to give whatever provisional definition he pleases of his own subject, as Mill does claim in so many words a little earlier in his Introduction. And it would also perhaps not be worth while to dwell on a merely historical blunder. But the question is, whether Mill's assertion, which is so obviously inconsistent with the contents of Aristotle's *Analytics*,

⁵ "To impart new" is a little too epigrammatic. Aristotle says merely that both forms of argument make use of preëxistent knowledge to do their teaching.

the standard work of ancient logic, is merely a historical error, or whether it is one of the consequences of a rather dangerous logical prejudice. If logic insists on taking into cognizance intellectual operations like definition, proposition, syllogism, and induction "only as they conduce to our own knowledge," and not at all as serving the purpose of imparting our knowledge to others, it cannot but take them into cognizance in a form which is misunderstood and misinterpreted. For it is more than doubtful whether that solitary rational being who, according to Mill, might be a perfect logician, would develop definitions, propositions, syllogisms, and inductive procedures exactly as ancient logic did under the influence of the Socratic new beginning in philosophy, namely, as parts of dialectic, the then new but soon forgotten art of creating knowledge by means of conversation. If logic really does not interest itself in the means of imparting knowledge to others, it should be on its guard in dealing with definitions, propositions, syllogisms, and induction; their immediate use for our own knowledge may be more limited than even the most cautious modern logician would suspect, as long as he ignores their history.

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